JOURNAL OF THE IRON AND STEEL INSTITUTE

VOLUME 184 1956

SUBJECT INDEX

[References to papers and articles given in full text are indicated by the word (*Paper*) following the page number.

Indexing of Alloy Steels and Other Alloys: In the indexing of alloy steels, carbon and iron are ignored and the alloying elements contained in the steel are arranged in alphabetical order; for example, all references to nickel–chromium–molybdenum steel will be found under the heading chromium–molybdenum–nickel steel. In the indexing of other alloys, carbon and iron, when present, are included in the title; iron, when present, is always mentioned first and the other elements follow in alphabetical order, carbon being in all cases mentioned last. Examples: "Iron–silicon–carbon alloys" and "iron–chromium–nickel–carbon alloys."]

Abrasion, fireclay refractories, 468
Abrasives, in blasting carbon strip, 233; Tripoli, for buffing compounds, 478
Accidents, causes and prevention in heat-treatment plants, 93; coking industry, U.S., 352; forging failures, 228
Accles and Pollock, heat-treatment plant for seamless tubes, 226
Accumulators, hydraulic, 362
Acetic–Anhydride/Chromic–Acid, explosion danger, 97
Achema XI, exhibition of analysis equipment, 494
Acid Process, chromium reactions, 355
Acid-Resistant Iron, high-silicon, study, 379
Acids, corrosion inhibitors, 494; dilute, corrosion of alpha–iron crystals, 108; effect of alloying elements on corrosion rate of iron, 244; effluent disposal, 235; fatty, inhibiting action, 380
Aciéries d'Hirson, manufacture and casting of Edgar Allen steels, 92
Activators, effect on case-hardening compounds, 226
Activity Sampling, in foundries, 222
Adamson, Joseph, and Co., ladle crane, 476
Adhesion, paint, use of wash-primer, 99; plating test, 235; vacuum-evaporated metal films, 99
Adhesives, metal-bonding, theory, 478; oxide undercoat, 366
Aerodynamics, ceramics drying ovens, 215; flow problems in iron and steel works, 82
Aerosols, use in corrosion research, 492
Affiliated Local Societies. *See* under names of specific societies
Age-Hardening, application of theory of dislocation, 106; evolution of structure of supersaturated solid solutions, 104; mechanism in supersaturated solid solutions, 104
Ageing, accelerated, application of dislocation theory, 483; effect on cold brittleness of rail steel, 241; effects in solid solutions, 485; embrittlement, use of zephirol etch, 490; magnetic, of pure iron, 370; soft unalloyed steels, hardness testing, 369; steels, effect of elements, 238
Agglomeration, methods used in U.S., 351
Agietron, electron-erosion unit, 233, 478
Air, cleaning equipment, testing, 471; flow in beds of granular solids, 355
Air-Heaters, blockage and corrosion, 352; *see also* Recuperators.
Air Pollution, 213, 353, 467; analysis of problem and methods of solution, 353; legal and health aspect in U.S., 111; public relations aspect, 467; *see also* Smoke
Aircraft Construction, airframe components, corrosion, 379; Comet, physical tests on cause of failure, 487; components, hardening, 226; components, use of ultra-high-strength steel, 111; engines, mechanized welding, 364; gas turbines. *See* Gas Turbines; propeller blades, fabrication, 363; "Sulf-Inuz" process, 227; ultrasonic inspection, 370; undercarriage, high-strength Cr–Mo–Ni steel, 111; use of die steels, 381
"Aja" Salt Baths, 226
Alcomax, magnetic and thermal properties, 103
Aldip Coating Process, 366
'Al-Fin' Process, aluminized layer study, 480
All-Union Steel-Making Conference, proceedings, 217
Allen, Edgar, and Co., Ltd., introduction of steels in France, 92
Alloy Cast Iron, analysis, spectrochemical method, 495
Alloy Plating, 235
Alloy Steel, castings, effect of nitrogen on solidity, 357; continuous casting, 88; creep properties at high temperature, 368; decarburized zone, microstructural observation, 243; depth of cementation by isothermal hardening, 228; determination of tungsten, with pyramidone, 245; determination of vanadium, amperometric method, 109–110; development at Avesta Steelworks, 104; engine valves, aluminium spraying, 236; extrusion of, 475; hardness at low temperatures, 452 (*Discussion*); heat content, 372; high, analysis, spectrographic, 491; high, analysis of welds, 495; high, effect of quenching on thermal conductivities and electrical resistivities, 6 (*Paper*); high, flame-cutting, 96; impact properties, 456 (*Discussion*);
Alloy Steel—*continued*
low, analysis, spectrographic method, 495; low, effect of quenching on thermal conductivities and electrical resistivities, 6 (*Paper*); low, endurance limit and torsional properties, 101; low, heat-treatment, structure, and properties, 104; low, high-strength, properties and applications, 246; low, quality test on spot welds, 484; low, relation of flake formation to hydrogen, microstructure, and stress, 102; low, stress-corrosion-cracking resistant, 493; low, structural hardening, for creep at high temperature, 104; low, welding requirements, 477; low, welding to stainless steel, 477; low, yield behaviour at low temperatures, 452 (*Discussion*); powders, 366; precision casting, 91; research methods, 104; sintered, elastic modulus, 240; temper brittleness, 370; tube, for high-temperature service, 104
Alloys, analysis, spectrographic, 491; analysis, spectrographic method, influence of graphite, 495; atomic and mechanical properties, 482; austenitic Cr-containing, paramagnetic properties, 370; austenitic, tensile tests at high temperature, 238; controlled-expansion, 357; electric contact, manufacture by infiltration, 481; foundry, 223; heat-resistant. *See* Heat-Resistant Alloys; high-temperature. *See* High-Temperature Alloys; homogeneity, study, 243; magnetic, high-frequency method for metallographic investigation, 372; non-scaling, application of theory of disorder, 367; plating, applications, 98; phase changes, magnetic study, 486; properties in relation to atomic structure, 372; special-purpose, review, 489; standards for spectrographic analysis, 495; thermo-chemical data (*Book*), 247; *see also* under specific types of alloy, 97
Alni Alloys, magnetic and thermal properties, 103
Alnico Alloys, magnetic and thermal properties, 103
Alpha Phase, determination of boundaries of Fe–N system, 302 (*Paper*); *see also* Gamma → Alpha Transformation

'Alspray' Process, for valve heads, 236
Alumicoat Process, 98
Alumina, analysis, spectrographic, 381; coatings, 366; *see also* Refractory Materials (Alumina)
Alumina Lime Silica Diagram, 354
Alumina Lime Silica Slag, rate of FeO reduction, 469
Alumina Lime System, transfer numbers of calcium ions, 217
Aluminates, reaction with Fe–Mn melts, 220
Aluminides, hardness, temperature dependence, 107
Aluminium, Aluminium Alloys, behaviour, and effect on austenitic grain size in steel, 105; coating on steel, 98; coatings, hot and cold ductility, 366; coatings, sprayed, for cathodic protection of steel, 108; coatings, thickness measurement, 236; cold-working studies, 490; comparison with steel, 111; contact corrosion with mild steel, 244; crystal-boundary hardening, 106; determination in carbon steels, low-alloy steels and pig iron, spectrographic method, 495; determination in high-alloy steels and alloys, spectrographic method, 491; determination of impurities by radioactive tracers, 109; determination in silicates and slags, complexiometric method, 492; determination in steel, concentration method, 110; determination in steel, titrimetric, 245; determination, volumetric, 380; dissolution in hydrochloric acid, 109; dissolution in nitric acid, 109; effect on ageing of soft unalloyed steels, 369; effect on determination of nitrogen in steel, 380; effect on sigma formation in iron-chromium system, 106; effect of ternary additions on ordering reaction in iron-cobalt, 106; energy of constrictions, 374; hardness changes during heating, 240–241; heat of fusion, 372; influence on graphitization of whiteheart malleable cast iron, 89; killed steel, for cold upsetting, tests, 474; liquid, reaction with iron, 366; melts, reaction with solid iron, 480; metallurgy of, 246; production from blast-furnace slag, 85; separation and direct determination, 245; separation from iron by ion exchange, 245; sprayed, use in protection of structural steel, 109; spraying, of alloy-steel engine valves, 236; spraying, 'Alspray' process, 236; sub-structures and networks of dislocations, 374; in transformer steel, 221; vacuum metallizing, 236; welding, inert-gas-shielded process, 232; welding to steel, 477; wire spraying, metal losses, 366; *see also* Iron–Aluminium–Chromium Alloys
Aluminium–Chromium Steels, stress-corrosion-cracking resistant, 493
Aluminium–Copper Alloys, behaviour in boiling acids, 378; dislocations, 374
Aluminium–Manganese Alloys, sub-structures and networks of dislocations, 374
Aluminium Sulphate, corrosion of carbon steel in, 380
American Brake Shoe Co., forging plant and products, 94
American Society of Mechanical Engineers, industrial furnaces, symposium, 360
American Society for Metals, impurities and imperfections, report of seminar, 373
American Welding Society, metal spraying on flat surfaces, 236
Ammonia, for corrosion protection, 243
Amsler High Frequency Vibrophone, 483
Analogue Computer, coke ovens, heat transfer calculations, 242; rheo-electric, application, 242
Analysis, 109, 244, 380, 491, 494; control, avoidance of excessive, 494; co-precipitation of Co with nickel dimethylglyoxime, 245; distinguishing pyrites from marcasite, 380; equipment, exhibition, 494; gas. *See* Gas; in Japan, 110; modern methods, 110; organization in iron and steel works, 380; oxidations with alkaline permanganate using monovalent thallium for back titration, 245; separation of Ca and Al from iron by ion-exchange, 245; trace, using radioactive isotopes, 244; use of quantometer, 383; use of Steelometer ST–7, 491
absorptiometric determination of Cr, Mo and Ni, 245
aluminium-reduction determination of oxygen in steel, 185 (*Paper*)
amperometric determination of vanadium in titanium alloys and alloy steels, 109–110
barium sulphate determination of sulphur in plain carbon steel, 110
bomb-combustion determination of sulphur in coal, 245
bromometric determination of vanadium by hydrazine, 245
chromatographic separation and analysis of gas mixtures, 245
colorimetric, of cast iron, 244; combined carbon in cast iron, 110; free cyanide in electroplating solutions, 244; lead in effluents, 110; molybdenum in stainless and chromium–molybdenum steels, 109; molybdenum in W-bearing steels, 381; nitrogen in iron and steel, 380
combustion determination: carbon in iron, 110, 494; sulphur, 110; sulphur in coal and coke, 245
complexiometric determination of aluminium in silicates and slags, 492; bismuth, nickel and cobalt with pyrogallol red, 110
concentration determination of Al, Cr, Mo, Sb, Ti, V, W, Zr in steel, 110
determination of: Al, Fe, and Ti, using cupferron and complexone, 245; boric acid in nickel-plating solutions, 244; C, P and S in steel, statistical analysis, 244; C and S in steel, use of induction-heating furnace, 110; Ca and Mg in limestones and dolomites, use of trilone B, 495; CO, 245; copper, use of resorcylaldoxime, 244–245; dissolved silica in siliceous dusts, 110; nickel, use of resorcylaldoxime, 244–245; nitrogen in steel, effect of Al, 380; oxygen and combustible material in coal, 245; phosphorous in iron, 244; silica, 246; sulphur in plain carbon steel, 110; total sulphur in coal, 110
electrolytic, mercury cathode apparatus, 245
ferricyanide-ceriometric determination of vanadium, 244
gravimetric determination of tungsten in concentrates and alloy steels, use of pyramidone, 245
iodometric determination: cobalt, 109; sulphur in minerals, slags, etc., 495
ion-exchange determination: Mo in steels, 381; Zn in presence of Fe and Ni, 381
magnetic determination of carbon, 110
microdetermination of copper, use of copper salicylaldoxime, 244
nephelometric determination of copper, 245
photocolorimetric determination of Mn in ores and minerals, 495
photometric, of cast iron and steel, 494
photometric determination: cobalt in steel, 109; molybdenum in steel, 245; Nb and Ta in steel, 381; nitrogen in steel, 380; phosphorus and silicon in steel, 109
polarographic, of slag, 246
polarographic determination: Cr, Cu, Pb, and Sn in steel, 381; ferrous and ferric iron in refractory minerals, 109; Mo in steels, 381; Nb Ta, Mn, Ti, and W in stainless steel, 110; tin in iron and steel, 381; V in steel, 381
potentiometric, of electroplating solutions, 479
potentiometric determination: Mn in high-silicon ores and steels, 110; vanadium in high-Cr steels, 244
radioactive, introducing phosphorus into metal and slag, 495
radioactive determination: inclusions in ball-bearing steel, 491; phosphorus, 491
simultaneous quantitative determination of carbon and sulphur in steel and cast iron, 244
spectro-, installation and control equipment, 244
spectroanalytical determination of carbon in steels, 245
spectrochemical: alloy cast iron, 495; clays and fireclays, 245; slags, 381; steels, 110
spectrochemical determination of Cr, Mn, Mo, Ni, and Si in alloy cast iron, 495
spectrographic: alloy standards, 495; alloys, 491; alumina, 381; carbon steels, low-alloy steels, and pig iron, 495; direct-reading attachment, 244; effect of impurities in standard samples 491; electrolytic baths, 495; free-cutting steel, effects of thermal treatment and deformation, 491; high-alloy steels, 491; magnesia, 495; magnesite in O.H. furnace, 495; quartz and high-silica materials, 495; slags, 381; stainless steels and alloys, influence of graphite, 495; statistical investigations, 491; steels, 491; steels, effects of cementation and nitridation, 491; steels, elimination of influence of other elements, 495; steels, parallel graph method, 491; steels, structural effects, 491; without internal standard, 495; X-ray emission, of thin films, 488
spectrographic determination: Al, Cr, Mn, Mo, Ni, Si and Ti in carbon steels, low-alloy steels, and pig iron, 495; arsenic distribution in steel, 495; arsenic in steel, 491; carbon, 110; carbon in iron alloys, 491; hydrogen in metals, 491; oxygen in steel, 491
spectrographic solution methods, for slag, 217
spectrophotometric, plate calibration, 495
spectrophotometric determination of cobalt-in steel, 110
spectroscopic determination of trace elements, 245
titrimetric determination of aluminium in steel, 245
vacuum-fusion determination: hydrogen in cast iron, 244; oxygen in cast iron, 110
vacuum-heating determination: hydrogen in iron, 244; hydrogen in steel, 238
vacuum-melting determination of gases in steels and cast irons, 110
volumetric, of gas, 381
volumetric determination of Al, 380
Analysis of, *see* under names of specific materials
Anisotropy, magnetic, of iron-nickel alloys induced by magnetic annealing, 103; strain-ageing of temper-rolled mild-steel sheet, 476
Annealing, 228; blackheart malleable iron, effects of trace amounts of tin, lead, and antimony, 90; cast iron, 227; chromium steel, effect on hardness, dimensions, and magnetic properties, 107; cold-worked metal, 227; differential, for deep drawing, 227; diffusional, chromium redistribution, 372; effect on ageing of soft unalloyed steels, 369; grey cast iron, 226; high-speed steels, 227; high-speed tool steel, 93; magnetic, induction of

Annealing—*continued*
magnetic anisotropy by, 103; nodular cast iron, 89; practice, Abbey Works, 43 (*Paper*); wire, plant, 365
Annealing Furnaces, batch-type, isothermal, at Arthur Balfour and Co., Ltd., 227; batch-type, mechanized, 225; coil, 473; electric bell type, for rod, 227; strip, batch-type, 227; in strip mills, 93
Anodes, mild steel, non-uniform dissolution, 243
Anthracite, use for smelting iron ore, 85
Antimony, determination in steel, concentration method, 110; effect of trace amounts on annealing of blackheart malleable iron, 90
Antimony–Lead–Tin Plating, 366
Appleby-Frodingham Steel Co., metallic recuperators, 82
Arandelovac Basin. clay deposits, 354
ARBED, gas turbine for electric generation, 214; Schack-type recuperators, 352; soaking pits with regenerators, 225
Arc Furnaces. *See* Electric Furnaces
Arc Melting, vacuum, 359
Argon, influence on tensile properties of wires, 484; uses, 469
Armco Iron, alternating bending strength at various grain sizes, 240; diffusion of copper into, 371
Armco Steel Corp., methods for decreasing O.H. scrap charging time, 87
Arsenic, determination in steel, spectrographic method, 491; distribution in steel, spectrographic determination, 495
Asphaltum, mastic coatings, 236
Atacocha District (Peru), ore deposits, 466
Atlas of Isothermal Transformation Diagrams (*Book*), 208
Atmospheres, furnace, analysis (recorders), 495; furnace, effect of oxygen content on vitreous coatings, 98; furnace, "Equiverse" control system, 225
Atmospheric Corrosion, filiform, 108
Atmospheric Pollution. *See* Air Pollution
Atomic Properties, alloys, 482
Atomic Reactors, selection of canning materials, 111
Austempering, chain saw parts, 228; Cr–Ni and Cr–Mo–Ni steels, effect on tempering-temperature/hardness relation and tensile properties, 361; methods, 228
Austenite, detection by X-ray method, 487; determination of content, 486; effect of temperature of formation, 376; effect of tungsten on isothermal decomposition, 106; formation in plain carbon steels, 376; grain-size determination, 373; isothermal formation, 376; primary, grain boundaries, brittleness due to, 486; solubility of vanadium carbide, 492; stabilization, 375; stabilization in martensitic transformation of ferronickel, 376; supercooled, intermediate transformation, 376
Austenite–Ferrite Equilibria, transformation temperatures, 414 (*Paper*)
Austenite–Martensite Transformation, 490; crystal geometry, 375; SAE 1050 steel, 376
Austenitic Alloys, tensile tests at high temperature, 238
Austin Motor Co. Ltd., drop forgings, manufacture, 362
Australia, corrosion problems in pulp and paper industry, 378; iron and steel industry, 382, 468, 496
Australian Iron and Steel Co., ladle crane, 476
Austria, coals, combustion calculations, 466
Auto-Union Works, 'Indugas' preheating chamber, 93
Automation, electrolytic tinning, 98; heat-treatment, 360; Norwegian foundries, 92; open-hearth furnaces, at Novo-Tagil' Works, 219; steel industry, 96
Automobile Engines, cam and tappet, design, materials, and lubrication, 246
Automobile Industry, cast metals for, properties, 222; drop forgings, manufacture, 362; hardening plants, 93; special steels, 495
Automobile Parts, bodies, pressing and stamping, 362; cylinder blocks, casting, 92; over-riders, polishing and plating, 479; springs, 362
Automobiles, sheet production for, 230; use of sintered materials, 481
Autoradiography, high-resolution, 373; micro, use in study of Cr redistribution, 372; wet-process, 495
Avesta Steelworks, alloy and special steels, 104
Axle Housings, stamping and welding line, 228–229
Axle Shafts, production, 362
Axles, forge for, 383
Ayrshire Dockyard, activities, 246

Babcock and Wilcox Co., pyrometric procedure in creep-rupture testing, 487
Bainite, formation, crystallographic relationships, 490; reaction in high-carbon steels, 375; transformation, 373
Bainite Hardening, high-speed tool steels, 227, 228
Balfour, Arthur, and Co., Ltd., batch type annealing furnaces, 227
Ball-Bearing Steels, carbide in, electrolytic isolation study, 105; determination of inclusions, radioactive method, 491; distortion after heat-treatment, 93; effect of metallurgical factors on life, 102, 470; effect of tempering temperature on internal stress of ring-type test pieces, 240; production problems, 356
Ballast Circuit Design, 483
Bar, grooved, stress gradients, 484; oxygen cutting, 97; rolling, in Japan, 95; transient strain fluctuations from longitudinal impact, 484
Bar Mill. *See* Rolling Mill
Bar Skimming, use of carbides, 364
Barium Sulphate, in Jugoslav iron ores, 351
Barium Titanate, strain gauges, 487
Barkhausen Effect, 241
Barytes, in iron ores, 351
Basic Process, chromium reactions, 355
Basset Process, 86, 217
Bassin du Nord, coke and gas production, 214
Batch Processes, statistical study, 246
Bath Tubs, quality control, 236
Battelle Memorial Institute, surface hardening, 361
Beams, I-section, rolling, 476; prediction of creep-deflection and stress distribution, 101
Bearing Steels, carbide formation, influence of composition, 105
Bearings, lubrication, theory, 477; porous, powder metallurgy, 99; powder-metal, lubrication practices, 100; roll neck, design, 95; rolling mill, economy in, 95; sintered iron, 481
Belgium, electrodeposition, progress and developments, 99
Bell Laboratories, corrosion of plastics and rubbers, 493
Bend Tests, alternating. Armco iron, at various grain sizes, 240; attachments to 1M-12A machine, 484; chromium–manganese case-hardening steel, 238; as crack sensitivity test, 238; device for grey iron specimens, 238; ductile cast iron, 496; notch, mild steel, 369; slow, comparison between notched and Charpy **V**-notched test pieces, 101; transverse, attachment to tensile machine, 237
Bending, cyclic, strain phenomena, 482; die design, 362; effect on mechanical
Bending—*continued*
properties of temper-rolled mild-steel sheet, 476; impact, mechanism of fracture under, 239; low-temperature, 485; operations, 228; plate, 230; reversible, steam-turbine shafts, 102; sheet, methods, 246
Bentonite, New Zealand, physico-chemical properties, 222; New Zealand, sand bonding properties, 224; plastic behaviour, 222; testing, 90
Bessemer Centenary, 113 (Paper); development of process in Russia, 469; exhibition at Offices of Iron and Steel Institute, 118
Bessemer Process, acid, 438 (*Discussion*); flame spectrum, 355
Bessemer Steel, basic, cold-working properties, 86; basic, development, 86; basic, hydrogen content, 218; basic, impact tests, 374–375; basic, manufacture, 218; basic processing, 86; basic, for rails, 111; basic, rimming steel ingots, 221; basic, use for rails, 246; early manufacture in Sweden, 382; rimming effect of notch size and shape on impact testing, 101
Betatron, Siemens–Reiniger 15-mV, performance, 242
Bethlehem Pacific Coast Steel Corp., rapid analytic methods for quality control, 110; Seattle plant, facilities and services, 355
Bethlehem Steel Co., ore and coal handling, 363; roll temperature study, 475
B.H.P., Newcastle works, 382; subsidiaries, 382
Bibliography, heat (*Book*), 247; iron, 469; mild steel, 469
Bifurcated and Tubular Rivet Co., Ltd., 480
Bigwood, Joshua and Son, Ltd., plate-working machines, 230
Biological Organisms, role in corrosion processes, 378
Birlec, Ltd., coreless induction mains-frequency furnace, 356
Bismuth, determination, complexiometric method, 110; heat of fusion, 372
Bitumen, use in prevention and control of corrosion, 108
Blairsville, *see* Westinghouse Corp.
Blanking, press, for discs, 474
Blast Furnace, air flow in beds of granular solids, study, 355; assessment studies, 249 (*Paper*); blowers. *See* Blast-Furnace Blowers; blowing-in, safety precautions, 469; bosh processes, 85; Boudouard equilibrium, 85; burden, crushing and sizing, 84; changes in static pressure along height, 355; charging and distributing system, 355; coke consumption, 216; conference, B.I.S.R.A., 463; construction in France, 468; construction, in U.S.A., 468; design, construction, and equipment, 84; effect of pressure on gas movement, 85; equipment developments, 84; gas stream distribution, 84, 85; gas transit times, 18 (*Paper*); hearth, behaviour of carbon blocks, 468; hearth-temperature measurement, 355; hot-blast valve, 468; hot-blast valves, questionnaire, 84; ISCOR, 354; joint stresses in steel structure and lining, 84; Jones and Laughlin's Aliquippa Works, 354; 9th Junior Conference, 79; lining, determination of wear by radioactive isotopes, 84; low-shaft, Demag-Humboldt, 84; low-shaft, experimental, 84; low-shaft, at Liège, 216; low-shaft, trials, 86; Margam Works (No. 4), 216; Netherlands, 468; phase transformations, 355; refractory materials, properties and selection, 83; Saint-Michel, 496; scale cars for Spain, 96; sealing of bosh area during banking, 84; Society d'Espérance-Longdoz, 354; stack shell, operating results, 84; thermodynamic equilibrium, theory and application, 84; thin-walled

Blast Furnace—*continued*
shafts, 84; throat, horizontal distribution of materials, 216; use of anthracite, 85; use of oxygen-air blast, 84; welded construction, 232; welding, 354
Blast-Furnace Blowers, axial, Sulzer, 355; gas engines for, at Société Cockerill, 214; use of gas turbines, 84
Blast-Furnace Coke. *See* Coke
Blast-Furnace Gas, electric power generation with gas engines, 82; production in Lorraine, 82; suitability as fuel gas, 353
Blast-Furnace Operation, behaviour of zinc, 216; effect of self-fluxing sinter, 469; inter-works school in Russia, 383; "iron-coke" production, 82
Blast-Furnace Practice, 84, 216, 354, 468; assessment studies, 249 (*Paper*); developments, 86; energy problems, at high pressure, 85; improvements at Kokura Steel Works, 216; Macedonian iron ores, 351; Ukraine, 217; use of ores of low bulk density, 85
Blast-Furnace Process, assessment studies, 249 (*Paper*); behaviour of sulphur, 85; influence of coke circulation on combustion process, 216
Blast-Furnace Stoves, creep tests on checker brick, 84; evaluation of conduction losses, 354; gas-burner design, 81; heat-storage principle and problems, IRSID tests, 216; performance criteria, 216; practice, in Spain, 467
Blasting, hearth, 234; thick steel plate, 234; *see also* Cleaning
Blistering, enamels, 237; hydrogen, 494
Bloomery Furnaces, VEB Maxhütte, 473
Blooming Mills. *See* Rolling Mills
Blooms, transport of cropped ends, 363
Blowers, blast-furnace. *See* Blast-Furnace blowers; turbo-, for iron and steel works, 331 (*Paper*); *see also* Compressors
Boeing Airplane Co., descaling process for titanium and stainless steel, 233
Boilers, automatic controls, 352; corrosion, 378; corrosion and embrittlement, 379; corrosion, foaming, priming and scaling prevention, 493; corrosion, low-temperature, 380; electro-tensometric testing, 368; feedwater, addition of phosphates and sodium sulphite, 244; 'Ignifluid' combustion technique, 467; oil-fired, corrosion and deposition, 378; shells, standard test specimens, 101; tensile tests, 484; tube and pipeline, properties of welds, 96; tubes, examination of failed, 368; tubes, scale deposits, 107
Bolt Steels, developments for high-temperature service, 372
Bolted Joints, loosening and fatigue strength, 369
Bond Testing, 370
Bonding, adhesive, theory, 478; conditions in metallic phases, 243
Bonney-Floyd Co., ladle practice for acid steel, 90
Boric Acid, determination in nickel-plating solutions, 244
Borides, properties, 377; transition metals, 372
Boron, condition in α-iron, 243; determination in high-alloy steels and alloys, spectrographic method, 491; effect in case hardening and strengthened steels, 242; influence on carbon steel, 361; influence on graphitization of whiteheart malleable cast iron, 89
Boron–Chromium–Nickel Cermet Coating, 235
Boron Steel, hardenability, 361; impact properties, 456 (*Discussion*); steels 15Kh and 12KhN2A, properties, 104
Boron–Titanium Steel, propreties, 221
Boron–Tungsten Steel, properties, 221
Boudouard Equilibrium in blast furnace, 85
Braby, Frederic, and Co. Ltd., sheet and plate works, 475
Bragg Soap Bubble Model, 367
Brake Drums, craze-cracking, 388 (*Paper*)
Brass, degassing, 359; plating, 480; plating, from cyanide-free alkaline solutions, 236
Brazil, chromite production at Pium–i, 213; mineral and metallurgical problems, 383; monazite deposits in Rio Grande do Norte State, 213; radioactive counter for prospecting, 112; St. John Del Rey Mining Co., Ltd., activities, 80; wire mill of Companhia Siderurgica Belgo-Mineira, 94
Brazilian Mineral Production Laboratories, nickel production, 383
Brazilian Society of Metals, 10th conference, 246
Brazing, alloys, lithium additions, 232; atmospheres for, 227; low temperature, effects of small amount of P and Ag in Cu–Ni–Zn alloys, 233; review, 478; stainless steel, with chromium nickel alloy, 233; use of propane, 96
Bricks, aerodynamic phenomena in drying ovens, 215
Bridge Steel, mechanical properties, 489
Bridges, highway, 381; ore, analysis of trolley wheel suspensions, 231; ore and coal, protective devices, 231
Brinkman Oil Burner, 353
Bristol University, conference on defects in crystalline solids, 374
British Association for the Advancement of Science, "Steelmaking Since Bessemer" (Presidential Address to Section B), 113 (*Paper*)
British Cast Iron Research Association, conference on foundry ventilation and dust control, 471
British Industrial Sands Ltd., quarry developments at Redhill, 224
British Iron and Steel Federation, iron and steel gallery at Science Museum, 121
British Iron and Steel Research Association, announcements, 78, 209, 463; automatic gauge control in rolling mills, 232; 24th Blast-Furnace Conference, 463; Cyclosteel process, 117 (*Paper*); furnace scanning periscope, 47 (*Discussion*); instrumentation of experimental rolling mill, 229; 9th Junior Blast-Furnace Conference, 79; 10th Junior Steelmaking Conference, 78; Open Days at Sheffield, 350; ore-handling investigations, 80–81; scanning periscope for O.H. furnace, 355–356; staff changes, 209; 47th Steelmaking Conference, 463; Works Transport Conference, 78
British Railways, corrosion laboratories, 379
British Steel Castings Research Association, conference on dust control and ventilation, 471
British Thomson-Houston Co., Ltd., effluent disposal, 235
British Welding Research Association, brittle-fracture test rig, 369; radiation safety precautions, 371
Brittle Fracture, 100; avoidance of, 486; evaluation of tendency of structural steels to, 488; mathematical theory, 486; mild steel, evaluation of method for determining tendency of, 369; mild steels, for welding, 364; phenomenon of, 238; prevention by overlays of notch-tough weld metal, 97; research, in France, 238; significance of minute cracks, 374–375; steel plates, 369; tankage steel plates, 241; test rig, 369; theories and experiments, 369; theory, 485; welded structures, 477
Brittleness, cold, rail steel, 241; iron-chromium alloys at 475° C, 369; mild steel, test for, 484; nitrided layer, evaluation, 486; normalized cast steel, 486
Bronze, anti-friction properties, 223
Brown Boveri, nitriding plants, 227
Buckling, solution, 368
Buffing, compounds, use of Tripoli, 478
Building Construction, use of steel frames for small dwellings, 495
Bunkers, design, 352
Burners, Brinkmann, for Siemens-Martin furnaces, 353; dual-fuel, 353; gas, for industrial furnaces, 215; Krause, 353; oil, for O.H. furnace, 360; STEC, 353; Schieldrop, 353; special, for conversion of cold gas furnaces to oil firing, 353; special, review, 467; Unimul, 353

C.A.F.L. St. Chamond Works, tyre forging, 474
"C. & D." Hot Top, 221
Cables, carbon steel, examination of failure, 368; fatigue-testing machine, 368; power and control, 231; steel pipe, cathodic protection, 108; winding drums for, 472
Cadmium, conversion coatings on, 235; determination in plating baths potentiometric method, 479; determination in slags, polarographic, 246; heat content, 372; heat of fusion, 372; plating, jet engine parts, 480; plating, structure of deposit, 98; salt-spray corrosion, 98; vacuum metallizing, 236; *see also* Iron-Cadmium alloys
Cadmium Coatings, comparison with zinc, 235
Calcium, determination in dolomites and limestones, use of trilone B, 495; separation from iron by ion exchange, 245; transfer numbers of ions in molten slags, 217
Calcium Aluminoferrates, solid solutions, 469
Calcium Carbide, desulphurization of pig iron with, 216
Calcium Hydroxide, in wire drawing industry, 229
Calcium-Oxide Wüstite System, 377
Calcium Plumbate, paint pigment, 481
Calibration, temperature-measuring instruments, 215
California, chromite ores, concentration tests, 81
California-Doran Heat Treating Co., automatic controlled-atmosphere bottom-quenching furnace, 473
California-Nevada, manganese ores, concentration tests, 81
Calstrip Steel Corp., Sendzimir rolling mill, 230
Cams, automobile, design, materials and lubrication, 246; flame hardening, 473
Canada, coal and coke production, 353; electrolytic tinplate, 235; finishing, 99; iron ores, 80; Kiruna Mine, 80
Cans, tinplate, corrosion, 493
Cape Breton, coals, production, 353
Carbides, 481; alloy, precipitated in 4th stage of tempering, 258 (*Paper*); application to bar skimming, 364; in ball-bearing steel, electrolytic isolation studies, 105; cemented, test method, 233; electrolytic separation from steel, 372; flame-plating, 100; formation in bearing steels, influence of composition, 105; formation, influence on high-speed tool steels, 369; formation by sintering, 367; formation in vanadium steel, 492; particles precipitated in α-iron, 105; phase changes on tempering Mo steel, 377; properties, 377; separation from chromium carbides, 482; separation, electrolytic method, 491; separations from supersaturated α-iron, 373; spheroidal, in steel, 489; structure of phases in V, 482; transition metals, 372
Carbon, behaviour in blast-furnace hearth, 468; combined, determination in cast iron, colorimetric method, 110; combustion mechanism, 467; content, effect on ageing of soft unalloyed steels, 369; deposition reaction over iron catalysts, 1 (*Paper*); determina-

Carbon—*continued*
tion, combustion method, 110; determination in iron, combustion method, 494; determination in iron alloys, spectrographic method, 491; determination, magnetic method, 110; determination, spectrographic method, 110; determination in steel, spectroanalytical, 245; determination in steel, statistical analysis, 244; determination in steel, use of induction-heating furnace, 110; determination in steel and cast iron, 244; distribution in cementation and decarburization of steel, 490; effect in foundry pig iron, 92; effect of interfacial tension of iron with slag, 469; effect on shrinkage of grey cast iron, 222; furnace atmospheres for control of, 226; influence on creep resistance, 104; influence of grain boundaries on behaviour in α-iron, 102; influence on martensites in steels, 489; in iron alloys, thermodynamics, 52 (*Discussion*); radioactive, use in study of diffusion in metals, 246; reaction with oxygen in liquid iron, 473; reduction of metal oxides, 469; solubility in iron alloys, 242; solution in liquid iron, 372; steam-carbon reaction, catalytic effect of oxides, 353

Carbon / Carbon-Dioxide / Oxygen / Steam System, 353

Carbon/Carbon-Dioxide Reactions, 215

Carbon Dioxide, adsorption and emission spectra, 81; for cores, 359; for cores and moulds, 358; equilibrium with carbon monoxide and steel, 93; influence on tensile properties of wires, 484; liquid, as coolant on copy-turning lathe, 233; in moulding sand, 359; moulding sand drying plant, 222; use in arc welding, 477; *see also* Carbon / Carbon-Dioxide / Oxygen / Steam System

Carbon Monoxide, absorbents for analysis, 245; adsorption and emission spectra, 81; carburization of iron oxide, 109; detection and determination methods, 245; equilibrium with carbon dioxide and steel, 93; hazard of, 471; influence on dehydration of iron ores, 81; purification of liquid steel in electric furnaces, 220; reduction of iron oxides, 469

Carbon-Monoxide – Hydrocarbon – Air Flames, concentration of equilibrium atom and free radical concentrations, and stability, 81

Carbon/Steam Reactions, 215

Carbon Steel, analysis, spectrographic method, 495; annealed, 489; austenite formation, 376; cable, fatigue failure, 368; carbo-nitrided, hardenability, 103; castings, effect of nitrogen on solidity, 357; characteristics of surface layers and elastic constants, 240; corrosion in aluminium sulphate, 380; creep properties at high temperature, 368; determination of arsenic, spectrographic method, 491; determination of sulphur, barium sulphate method, 110; distribution of inclusions in ingots, 470; effect of heat-treatment on machinability, 478; effect of quenching on thermal conductivities and electrical resistivities, 6 (*Paper*); elastic constants, 361; etchant for cementite and phosphorus, 373; extrusion of, 475; forgings, segregation flaws, 474; grain size, 485; hardness at low temperatures, 452 (*Discussion*); high, bainite reaction, 375; high, metallographic investigation of tempering, 105; high, tempering, 361; high, wire, continuous strand-annealing and galvanizing plant, 365; high-temperature properties, 104; influence of boron, 361; ingot, segregation, 470; low, arc welding electrodes for, 233; low, plastic deformation, 238; low, seam welding of dissimilar thicknesses,

Carbon Steel—*continued*
232; low, toughness of, quench-hardened, 375; medium, retention of hardness, after electrospark hard-facing, 361; medium, sheet, formation of coarse-grained structure, 375; notch toughness, effect of microstructure, 239; sintered, elastic modulus, 240; surface layer behaviour, 361; tempered, cementite orientation, 490; tempering, 148 (*Paper*); wear resistance, 488; welding requirements, 477; wire, mechanical properties at low temperatures, 452 (*Discussion*); yield behaviour at low temperatures, 452 (*Discussion*)

Carbonization, coal, behaviour of pyritic and organic sulphur, 353; coal, Cape Breton, 353; coal, thermochemical transformations of S compounds, 353; "Coal Logs" process, 353; control of gas flows, 352; cracking of coke, 352; development in France, 214; dry cake, 215; Lorraine coals at Thionville, 214; low-temperature, of lignite and non-coking coals, 215; tests with Tuscaloosa coke oven, 353

Carbonyl Iron, heating, dilatometric study, 376; powder, preparation, properties and application, 237

Carboxyreactivity, coke, continuous determination, 353

Carburization, carburizing-decarburizing potentials, 227; comparison of American and German methods, 228; depth of cementation of alloy steel by isothermal hardening, 228; effect of activators, 226; electrolytic, 226; equilibrium of CO–CO_2–steel, 93; gas, commercial practice and application of equilibrium data, 226; gas, furnace, 361; gas, furnaces and process, 226; gas, of gears, 226; gas, mechanism and equipment, 361; gas, theory and applications, 227; iron oxide, with carbon monoxide, 109; malleable cast iron, 472; mathematical treatment, 226; simultaneous, with oxidation, 226; slow-cooling cracks, 473

Carburizing Steels, molybdenum-containing, for gearing, 221

Carling Coke, production process, 215; use in blast furnace, 215

Case Hardening, compounds, effect of activators, 226; depth-of-chill test, 486; depth determination, 226; gas, furnaces for gears, 226; methods, 361; simultaneous carburization and oxidation, 226

Case-Hardening Steel, chromium-manganese, bending and impact tests, 238; effect of boron, 242; oxide inclusions in, 226

Cast Iron, alloy, analysis, spectrochemical method, 495; alloy, structure, properties and applications, 471; analysis, colorimetric, 244; analysis, electrolysis, 245; analysis, photometric methods, 494; analysis, separation, 245; austenitic, growth, 472; corrosion rating, 492; determination of carbon and sulphur (simultaneous), 244; determination of combined cast iron, colorimetric method, 110; determination of gases by vacuum melting, 110; determination of hydrogen, vacuum-fusion, 244; determination of non-metallic inclusions, 105; determination of oxygen, vacuum-fusion method, 110; ductile. *See* Ductile Cast Iron effect of gases, 89; enamelled, strains in, 236; enamelling, 366; flame hardening, 226; fluidity, effects of composition and pouring temperature, 92; gas-tight, for refrigerators, 89; graphite growth, 223; graphitization, 222; grey. *See* Grey Cast Iron; hardenability tests, 92; hardening, 361; high-strength, for Diesel engines, 472; for high-temperature service,

Cast Iron—*continued*
89; inoculated, fracture under biaxial stresses, 89; inoculation, 472; intermediate refining, 471; malleable. *See* Malleable Cast Iron; for mineral industry, 223; moulds, theory of cracking, 221; nodular. *See* Nodular Cast Iron; pipe, failures, 223; pressure pipes, centrifugal casting, 358; segregation, radiographic study, 372; simultaneous production with cement, 217; softening heat treatments, 227; spheroidal graphite. *See* Spheroidal Graphite Cast Iron; stress measurement, 240; structure, effects of gases, 472; structure, influence of mechanism of formation of casting, 225; structure and properties, review, 470; surface preparation for enamelling, 366; technology of melting in cupola, 89; tensile strength, factorial analysis, 368; testing methods, 92; thin, production for enamelling, 366; time-temperature transformation diagram, 471; white. *See* White Cast Iron; yield-point determination by sound propagation, 368

Cast Steel, analysis, photometric methods, 494; gas and inclusions in, 357; heat treatment, 360; impact properties, (high-temperature), 90; for mineral industry, 223; normalized, brittleness of, 486; types and uses, 224

Casting, centrifugal. *See* Centrifugal Casting; continuous. *See* Continuous Casting; contraction after, 472; feeder heads, 223; gating design, 90; investment. *See* Investment Casting; mechanical, of pig iron and non-ferrous metals, 84; modern methods, 91; piston rings, choice of materials and methods, 89; precision. *See* Precision Casting; risering of nodular iron, effect of silicon content, 358; risers, calculation of dimensions, 358; risers, hot-top, 358; steel, pouring system, 357; vacuum, 359; vertical gating system, 222; winding drums, 472

Casting Machines, 84; mould coatings, 84

Casting Pits, practice, 88, refractories, 216, 468

Castings, for automobile industry, 222; barrel grinding and polishing, 98; cleaning, by powder cutting, 233; cylinder blocks, 92; defects, 90, 359; design, use of stress analysis, 472; Diesel engine, 472; engine face plate, 359; feeding, use of exothermic materials, 358; grey iron. *See* Grey Iron Castings; high-speed steel tools, structure and properties, 88; influence of mechanism of formation on structure, 225; iron and steel, in Japan, 222; marine engine, quality control and acceptance tests, 371; precision. *See* Precision Castings; with reduced chromium content, production, 371; shell-moulded, 222; shell-moulded, dimensional tolerances and surface structure, 91; solidification, effect of mould material, 472; specialty, 359; steel. *See* Steel Castings; supersonic testing, 238; thin, moulding sand for, 359; use of indirect chills, 92; use of insufficient chills to promote controlled solidification, 92; vertical plate, vertical gating system for, 222; X-ray examination, 101

Catalytic Cracking Plant, corrosion and erosion, 378

Cathodic Polarization, studies, 365

Cathodic Protection, application of polarization, 492; buried or immersed metals, methods and procedure, 244; buried steel, 107; calculation of currents, 380; conduits, use of zinc anodes, 108; crack arrest by, 377; film resistance in sea water, 494; Kwinana Refinery, 108; mechanism, 365; oil installations, in Kuwait, 379; pipe cables, 108; pipelines, 108;

Cathodic Protection—*continued*
review, 492; spread of protection, lack of, 494; steel, use of sprayed aluminium coatings, 108; tankers, 494; theory and application, 378; underground steel pipes, 244; underwater, use of magnesium anodes, 243; water tanks at Los Angeles, 494
Cavitation, erosion, 493–494; in hydrodynamics (symposium), 493; mechanism, 492
Cement, blast-furnace, properties, 85; coating and lining for steel pipe, 236; Portland, use of aluminous blast-furnace slag, 85; simultaneous production with cast iron, 217; simultaneous production with pig iron by Basset process, 86
Cement-Sand Steel Casting Methods, 224
Cementation, carbon distribution, 490; effects on spectrographic analysis, 491
Cementite, free, etchant for, 373; influence of elements on properties of, 490; orientation in tempered carbon steel, 490
Central Research Institute for Ferrous Metallurgy, discussion on ball-bearing steel, 356
Centrifugal Casting, cast-iron pressure pipes, using sand-resin lining, 358; machine for discs and wheels, 91
Centrifugal Castings, cylinder liners, 359; long-length and bi-metal, 91
Ceramics, aerodynamic phenomena in drying ovens, 215; research laboratory, 380; strainer cores, draft standard, 91; vibratory compacting of powders, 99
Cermets, 481; deposition, on metal or alloy surface, 235; flame spraying on to engine components, 236; microstructure and physical properties, 481; powder metallurgy, 99
Chain Saw, parts, austempering, 228
Chains, hand-wrought, in Midlands, 496
Channel Master Co., recovery of plating wastes, 365
Chemical Industry, corrosion, effect of microstructure, 378
Chemical Process Industry, alloys for, 357; stainless steel, selection and application, 246
Chevrolet Motor Division, foundry, 358
Chevrolet Tonawanda Plant, 473
Chiatursk Carbonate Manganese Ores, production of ferromanganese, 221
Chill Test, use for melting grey cast iron, 471
Chills, cast-iron disc, range of effectiveness, 92; indirect, use, 92; use of insufficient for controlled solidification, 92; use in sand moulds, 91
Chimneys, factory, design, 467
Chlorides, corrosion of iron, 380; metal, production from oxides, 351–352
Chlorine, effect in electrolytes, 380
Christiania Spigerwerk, electrically heated soaking pits, 93
Chromate Coatings, 480
Chromate Process, tinplate, 480
Chrome. *See* Refractory Materials (Chrome)
Chromel-Alumel Thermocouples, 83
Chromic Acid, solution, filtering, 479
Chromic-Acid/Acetic-Anhydride, explosion danger, 97
Chromite Ore, California, concentration tests, 81; deposits, India, 351; World deposits, 351; production at Pium-i (Brazil), 213
Chromium, determination in alloy cast iron, spectrochemical method, 495; determination in carbon steels, low-alloy steels, and pig iron, spectrographic method, 495; determination in cast iron and steel, photometric method, 494; determination in high-alloy steels and alloys, spectrographic method, 491; determination with Spekker absorptiometer, 245; determination in steel, 381; determination in steel, concentration method, 110;
Chromium—*continued*
diffusion, 479; effect on paramagnetic properties of austenitic alloys, 370; effect on temper brittleness, 370; electroplating in ultrasonic field, 365; influence on creep resistance, 104; neutron-capture gamma-ray spectra, 104; polarization in H_2SO_4, 489–490; porous deposits, antifriction properties, 103; reactions in acid and basic furnaces, 355; recovery from slag, 356; redistribution during diffusional annealing, 372; substitution by silicon in casting alloy, 371; *see also* Iron–Aluminium–Chromium Alloys; Iron–Chromium Alloys
Chromium Carbide, precipitated in 4th stage of tempering, 258 (*Paper*); separation from iron–tungsten carbides, 482
Chromium–Cobalt–Nickel Steel, properties, effects of N, Nb, Ti, and V, 242
Chromium Iron, influence of heating velocity, 492
Chromium – Manganese – Molybdenum – Nickel Steels, weldability and mechanical properties, 96
Chromium–Manganese–Nickel Steels, stainless, specifications and corrosion properties, 357
Chromium–Manganese Steel, austenitic, structure at high temperatures, 107; bending and impact tests, 238
Chromium–Manganese–Tungsten Steel, low-temperature treatment, 360
Chromium–Manganese–Vanadium Steel, effect of tungsten on isothermal decomposition of austenite, 106
Chromium–Molybdenum–Nickel Alloys, 357
Chromium–Molybdenum–Nickel Steel, austempering, 361; for castings, 224; creep tests, 105; distribution of inclusions in ingots, 470; optical and electron microscope investigations, 105; use for aircraft undercarriages, 111
Chromium–Molybdenum Steel, creep, 240; creep and relaxation, 485; corrosion fatigue, effect of heat-treatment, 493; determination of molybdenum, colorimetric method, 109; structural hardening, 104; for tube, influence of vanadium on creep and rupture strength, 238; welds in high-pressure piping, 478
Chromium–Molybdenum Weld Metal, temper brittleness, 232
Chromium–Nickel Alloys, brazing, for stainless steel, 233; for heaters, effect of strain on oxidation, 489; oxidation resistance, 379
Chromium–Nickel Melts, oxygen solubility, 492
Chromium–Nickel–Silicon Alloy, welding electrode for, 364
Chromium–Nickel Steel, austempering, 361; austenitic, high-temperature strength properties, 104; austenitic, piping, welding, 478; austenitic, structure at high temperatures, 107; austenitic, tubing, welding, 478; for castings, 224; chemical polishing, influence of deformation, 234; sigma-phase, occurrence, 289 (*Paper*); welding, 477
Chromium–Nickel–Titanium Alloys, relation between composition, temperature and heat resistance, 371
Chromium–Nickel–Tungsten Steel, carbide separation, 482; type 40 KhNVA, 88
Chromium Plating, effect on fatigue strength of hardened steel, 479; engine cylinders, 235; hard, tool steels, 365; organic finishes, 480; self-regulating bath, 365; use of interference microscope for thickness measurement, 107
Chromium Steel, alloy carbides precipitated in 4th stage of tempering, 263 (*Paper*); creep-resisting, use in steam power plant, 122 (*Paper*); determination of vanadium, potentiometric, 244; effect of annealing on hardness,
Chromium Steel—*continued*
dimensions and magnetic properties, 107; effect of ferrochromium in charge, 357; effect of inclusions, 242; effect of molybdenum, 242; magnet, heat treatment, 360; passivation in H_2SO_4, 365; passivation in nitric acid, copper-sulphate/sulphuric-acid and tap water, 365; springs, high-temperature fatigue and relaxation tests, 246
Chromium–Titanium System, 491
Chromium–Vanadium Steel, impact tests, 374–375
Chromizing, pack, in Cr_2O_3 mixture, 365
Chro-Mow Steel, 381
Cinders, pyrites, as pig-making material, 81
Circuits, ballast, design, 483
Clad Steel, properties and uses, 98; welding, 96
Clays, analysis, spectrochemical, 245; as binder in synthetic foundry mixtures, 359; bonded moulding sand, hot strength of, 358; bonding agents, theoretical aspects, 90; differential thermal analysis, 354; differential thermal analysis, preparation of samples, 83; effect of water content, 224; infra-red drying rates, 83; refractory, deposits of Arandelovac Basin, 354; wet, use in foundry sands, 90
Cleaning, 97, 233, 365, 478; abrasive blasting of scale, 233; air, equipment, testing, 471; alkali, electro-alkali, emulsion, solvent, and vapour methods, application to degreasing, 97; application of ultrasonics, 233; blast, 233; blast-furnace gas, 216; blasting, symposium, 234; blasting and shaking, 234; castings, by powder cutting, 233; costs, 234; drum, 365; efficiency, 98; electrochemical efficiency assessment, 478; electrolytic, 234; for electroplating, 234; flame, 234; flame, influence on strength of constructional parts, 234; flame, of rolled material, 234; gas, 215, 467; gas, equipment, 467; metal articles, American specifications, 380; oil spreading rates, 233; for phosphating, 234; ultrasonic, 98, 365, 479; wet, high-pressure, for smaller foundry, 472; wet, plant, 479
Cleveland Ironstone, sintering, 434 (*Paper*)
Coal, Austrian, combustion calculation, 466; carbonization, behaviour of pyritic and organic sulphur, 353; coking, analysis and testing, 352; coking, low-grade, for metallurgical coke, production, 214; coking, methods of study and principles of production, 352; determination of oxygen and combustible material, 245; determination of sulphur, Sheffield high-temperature method, 245; determination of sulphur, use of 4-amino-4′-chlorodiphenyl hydrochloride, 245; determination of total sulphur, 110; evolution of energy linked coal and steel industry, 469; handling, 363; imports and production in Japan, 80; Longwy-Burstlein process of cleaning, grading, and blending, 352; Lorraine, characteristics, 352; Lorraine, coke production by Carling process, 215; mechanical properties, 352; minerals, high-temperature reactions during combustion, 213; non-coking, "Coal Logs" process, 353; non-coking, low-temperature carbonization of, 215; non-coking, metallurgical coke from, Longwy-Burstlein process, 82; organic sulphur, 82; production in Canada, 353; production and utilization in U.K., 214; Queensland, 352; statistical analysis, 383; thermochemical transformations of S compounds during carbonization, 353; total gasification, 215; uses other than as fuel, 351
Coal Bridges, protective devices, 231
"Coal Logs" Process, 353

Coal Tar, coatings, for underground use, 480
Coal-Tar/Enamel Coatings, on steel pipe, electrical tests, 236
Coatings, 98, 234, 365, 479; asphaltum mastic, 236; brittle, for stress observation, 484; coal tar, for underground use, 480; coal-tar/enamel, on steel pipe, electrical tests, 236; conversion, on zinc and cadmium, 235; electron-microscope replicas, 104; electrophoretic deposition, 479; electrostatic, 480; fatigue-strength evaluation, 369; metallic, quality control in France, 99; metallized layer, testing strength of adhesion, 479; non-metallic and organic, review, 492; organic finishes, 480; petroleum-type, assessment, 244; pipelines, 108; plastic, 236; plastic, for metalwork, 98; stop-off, strippable, 480; surface, influence on penetration of grey iron into sand cores, 472–473; tests, 98; *see also* under specific types of coating
Cobalt, co-precipitation with nickel dimethylglyoxime, 245; determination in cast iron and steel, photometric method, 494; determination, complexiometric method, 110; determination in high-alloy steels and alloys, spectrographic method, 491; determination, iodometric method, 109; determination in steel, photometric method, 109; determination in steel, spectrophotometric method, 110; effect on resistivity of nickel ferrites, 481; electroplating in ultrasonic field, 365; hardness changes during heating, 240–241; neutron-capture gamma-ray spectra, 104; plating, structure of deposit, 98; *see also* Iron–Cobalt–Vanadium system
Cobalt Aluminide, hardness, temperature dependence, 107
Cobalt-Nickel Alloys, high-temperature strength properties, 104
Cobalt Oxide, catalytic effect on steam-carbon reaction, 353
Cobalt–Platinum Alloy, magnetic and thermal properties, 103
Cobaltites, preparation, 481
Co-Elinvar, properties, influence of nickel, 242
Coiling, strip, Abbey Works, 39 (*Paper*)
Coils, annealing furnaces for, 473; design, 227
Coining, sheet metals, 362
Coke, analysis and testing, 352; assessment of particle size distribution, 352; blast-furnace, mechanized strength testing, 467; blast-furnace, production, 353; blast-furnace, quality assessment, 467; bulk density, 467; Carling production process, 215; Carling, use in blast furnace, 215; characteristics and tests, 82; consumption in blast furnace, 216; consumption in cupola, 223; continuous determination of specific carboxyreactivity, 353; cracking during coking process, 352; for cupolas, quality, sampling and tests, 353; determination of sulphur, Sheffield high-temperature method, 245; dry cooling as alternative to quenching, 353; grinding, influence on quality, 352; index for mechanical strength, 82; industry, injuries in U.S., 352; industry and by-products in U.S., 352; influence of circulation in blast-furnace process, 216; metallurgical, assessment of quality, 215; metallurgical: mechanical, thermal, and chemical properties, 353; metallurgical, from non-coking coals, Longwy-Burstlein process, 82; metallurgical, production, 351–352; metallurgical, production in Canada, 353; metallurgical, properties of different size fractions, 353; metallurgical, use of low-grade coking coals, 214; metallurgical, use and properties in Lorraine, 215; production in Bassin du Nord and Pas-de-Calais, 214; production from Ruhr coals, 215; properties, study by IRSID, 215; properties and determination, 82; semi-, from peat, 352; "Sovaco" blending and crushing process, 215; special, production, 352
Coke-Oven Gas, analysis, chromatographic, 245; flames, increase of emissivity, 214; hydrogen sulphide removal, 215; production in Lorraine, 82; suitability as fuel gas, 353
Coke-Oven Plant, equipment at Neuves-Maisons, 214; "Emma", Netherlands State Mines, 214; for handling different coal mixtures, 214; recovery of incandescent heat, 353; Sidelor-Micheville, at Villerupt, 214
Coke-Oven Practice, dry cooling as alternative to coke quenching, 353; in Spain, 467; use of dry cake mix, 215
Coke Ovens, by-products, in Russia, 214; chamber width, 352; construction of large-capacity, proceedings of conference, 214; Jones and Laughlin's Aliquippa Works, 354; Lorraine Valley iron-smelting industry, 214; operational data in U.S., 352; replacements, 214; Tuscaloosa, tests, 353
Coking. *See* Carbonization
Coking Industry, steam and power demands, 82
Cold Brittleness. *See* Brittleness
Cold Dressing. *See* Dressing
Cold Forming. *See* Forming
Cold Roll-forming. *See* Forming
Cold Working. *See* Working
Collodion, electron-microscope replicas, 104
Colombia (South America), iron foundry and steelmaking practice, 111
Colorado Fuel and Iron Corp., continuous rod mill at Pueblo Works, 95; heating up O.H. furnaces with natural gas at Pueblo Works, 82
Combustion, in blast-furnace, influence of coke circulation, 216; calculations for Austrian coals, 466; carbon, mechanism, 467; coal minerals, high-temperature reactions, 213; continuous reheating frunaces, 360; cupolas, 360; efficiency, 213; 'Ignifluid' technique for steam boilers, 467; in industrial furnaces, 360; mechanism, significance of reactions of low activation energies, 214; open-hearth furnaces, 360
Comet Airliners, physical tests on cause of failure, 487
Commonwealth Steel Co., Schloemann hydraulic forging press, 228
Communications, electronics in, 487; systems in iron and steel industry, 231
Compacting, vibratory, of powders, 99
Compagnie des Compteurs et Manomètres, Elektra spark-machining equipment, 478
Companhia Siderurgica Belgo-Mineira, wire mill, 94
Complexone, use in separation and direct determination of Al, Fe and Ti, 245
Composition, relation between temperature and heat resistance, Cr–Ni–Ti alloys, 371
Compressed Air, hot, use at Kiruna Mine, 80
Compressibility, iron powders, 366; metals, dynamic determination, 239
Compression Tests, attachment to tensile machine, 237
Compressors, positive-type rotary, 316 (*Paper*); turbo-, for iron and steel works, 331 (*Paper*); *see also* Blowers
Concentration Tests, California chromite ores, 81; California–Nevada manganese ores, 81
Concrete, aggregate, use of blast-furnace slag, 85; prestressed, steels for, 111, 496; refractory, design data, 83; reinforced, fusion pressure welding of steel sections, 96
Condensers, synchronous, for steelworks service, 231; tubes, corrosion, 244
Conduction, losses in blast-furnace stoves, 354
Conductors, semi, effects of impurities and imperfections, 373
Conduits, cathodic protection, use of zinc anodes, 108
Conferences, All-Union, of rolling-mill operators, 94; All-Union Steelmaking, 217; B.I.S.R.A., 78, 79; blast-furnace, B.I.S.R.A., 463; Brazilian Society of Metals, 246; corrosion, in Melbourne University, 377; defects in crystalline solids, Bristol University, 374; Missouri Valley Regional Foundry (1955), 357; steelmaking, B.I.S.R.A., 463
Consett Iron Co. Ltd., replacement of old coke-ovens, 214
Constructional Steel, salt-bath tempering, 360; *see also* Structural Steel
Containers, tinplate cans, corrosion, 493; tinplate and glass, 98
Continental Steel Corp., rod mill, 363
Continuous Casting, 246, 357; alloy steels, 88; rupture of billet skin, 88; semi-, of steel, in Germany, 88; steel, 86; vertical, of steel, 86
Contraction, linear, measurement, 472
Control, analytical, avoidance of excessive, 494; automatic, in steel industry, 96, 482; equipment, in France, 246; equipment in process industries, 482; process, in steel industry, 232
Control Systems, automatic, for fatigue testing equipment, 483; hydraulic, for strip handling, 363; in Japan, 367; magnetic amplifier, for mills and process lines, 363
Conversion Coatings, 235
Converter, acid, excessive oxidation, 218; basic, deoxidation and desulphurization, 218; basic, operation, 218; basic, progress review, 218; Bessemer, determination of end of blow, 469; behaviour with different bottoms, 355; characteristics and production data (IRSID), 218; continuous temperature measurement, 217; dephosphorization, 219; "L–D" oxygen process, 218; monolithic linings, 217; oxygen process, 218; process, factors influencing Galey opacimeter data, 219; prospects for various practices, 469; shape and size trials by IRSID, 218
Converter Process, continuous temperature measurement, 86; economics, 217; end-point determination, 87; factors affecting regularity of melt, IRSID studies, 87; oxygen, for high-quality low-carbon steel, 355; oxygen requirements, 86; oxygen steelmaking plant and process, 355; refining of phosphoric pig iron and Thomas steel, 86; use of oxygen and oxygen-steam, 86
Converter Steels, weldability, 96
Conveyors, blanket, 476; furnace, 361; ore and coal handling, 363
Cooling, steam, convection flow, 96
Cooling Systems, use of corrosion inhibitors 378
Cooling Towers, 231
Copper, addition to iron powder compacts, 237; anodes in acid and cyanide plating baths, 480; creep fracture, 485; degassing, 359; determination, nephelometric, 245; determination in plating baths, potentiometric method, 479; determination (micro) in presence of foreign metals, use of copper salicylaldoxime, 244; determination in steel, polarographic, 381; determination, use of resorcylaldoxime, 244–245; dissolution in nitric acid, 109; effect of additions on iron powder, 481; effect on corrosion of iron, 244; electrodeposition, change of cathode polarization, 365; electro-

Copper—*continued*
lytic, diffusion in iron, 371; electroplating in ultrasonic field, 365; grain boundary, diffusion of silver in, 374; hardness changes during heating, 240–241; micro-hardness tests, 486; plating, bright, 480; plating, current distribution in acid solution, 480; plating, structure of deposit, 98; powder, self-diffusion and flow, 367; slip-band extrusion, 372; *see also* Aluminium–Copper Alloys
Copper–Manganese Steel, weldability, 477
Copper–Nickel Diffusion Couples, 374
Copper–Nickel Steels, composition, corrosion-resistance, properties and uses, 372
Copper–Nickel–Zinc Alloys, effects of phosphorus and silver in Cu–Ni–Zn alloys on wettability and brazed strength, 233
Copper Oxide, reactions with Fe or Fe_3O_4, 107
Copper Salicylaldoxime, use in microdetermination of copper, 244
Copper Steel, hot tearing, 477; wear resistance, 103
Copper–Sulphate/Sulphuric–Acid Solution, passivation of chromium steel in, 365
Copper–Tin Alloys, plating, 98
Copper–Tungsten Alloys, manufacture by infiltration, 481
Cores, baking experiment, 358; baking reactions, 225; binder, containing 90% corn sugar, 225; boxes, prevention of blow-by, 91; carbon dioxide process, 358, 359; for exhaust manifold, 358; influence of materials on hot tears, 358; sand, penetration of grey iron into, 472–473; sand-blowing machine, 91; shell, developments, 358; shell, production and application, 359; shell, progress, 357; strainer, ceramic, draft standard, 91; strainer, use of, 91
Corning Glascast Process, 91
Corrosion, 107, 243, 377, 492; airframe components, 379; air heaters, 352; alpha-iron crystals in diluted acids, electrochemical investigations, 108; atmospheric, electrochemical investigation, 492; boiler plants, 380; boilers, 378, 379; buried pipelines, 493; carbon steel, in aluminium sulphate, 380; catalytic cracking plant, 378; cathodic protection. *See* Cathodic Protection; cavitation. *See* Cavitation; chemical, mechanism, 492; chemical industry, effects of microstructure, 378; chromium–manganese–nickel stainless steels, 357; chromium steel in HNO_3, 365; condenser tubes, 244; in confined spaces (gaps and slots), 493; contact, mild-steel/aluminium–alloy, 244; control in oil- and gas-producing equipment, 108; costs of prevention, 377; drill pipes, 108; dyeing and finishing works, 108; electric utility systems, 108; electrochemical, in nearly neutral liquids, 244; electrochemical, theory, 493; environments and problems in Kuwait, 379; ferrous metals in water systems, 109; by flue-gas condensates, 379; fretting. *See* Fretting Corrosion; galvanic, mathematical studies, 244; galvanic mechanism, 492; gas industry, 377; gas mains, 377; by heat-exchange fluids, 494; heat-exchange systems, 493; heating and ventilating equipment, 493; by hydrogen sulphide, mechanism, 243; inhibition phenomena, 494; inhibitors. *See* Corrosion Inhibitors; intercrystalline, in stainless steel, detection of, 493; intergranular, 492; intergranular, elimination by h.f. surface heating, 364; intergranular, of stainless steel, 378, 493; iron, in chlorides, use of polarization curves, 380; iron in nitric acid, 379; iron, in soils, 378; iron and mild
Corrosion—*continued*
steel, 469; iron powders, determination, 492; iron and steel, review, 492; laboratories, British Railways, 379; marine, Royal Australian Navy, 379; mechanism, 377, 379; nuclear reactors, 378; oil-fired boilers, 378; organic, 493; petroleum distribution and refinery plant, 378; in petroleum industry, 108; pinpoint, avoidance by correct rinsing practice, 97; pipes, steam and condensate, 493; plastics, 493; pouring-pit refractories, by molten steels and slags, 83, 215; precautions in site engineering, 380; prevention, 377; prevention in power station water-steam cycle, 378; pulp and paper industry, Australia, 378; rate, of iron, effect of alloying elements, 244; rates, electrochemical aspects, 377; rates, pilot plant for study of, 492; rating chart, 492; reaction, for buried iron, temperature coefficient and heat of activation, 107; refractories, 468; research in Russia, 108; research, use of aerosols, 492; research, use of polarization, 492; research laboratories, Massachusetts Institute of Technology, 494; review, and effects of stress, 377; role of biological organisms, 378; rubbers, 493; in ship construction, 108; stainless steel in chemical industries, 246; stainless steel, by sodium sulphate, 243; steel surfaces, freshly formed, 493; stray current electrolysis, 378; sweet oil wells, 108; symposium, 377; tanks, by hydrogen sulphide, use of ammonia, 243; temporary preventives, mechanism, 378; tinplate cans, 493; tropical, 109, 493; types, mechanisms, 492; water, magnetic treatment apparatus, 108; wet, electrochemical and chemical factors, 108; zinc, in waters, 380
Corrosion Fatigue, low-alloy Cr–Mo steel, effect of heat-treatment, 493; mechanism, 492; pit-ropes, 379; testing machine using wire test pieces, 369; tests, 483
Corrosion Inhibitors, for acids, 494; anodic, mechanism, 378; classification, 494; in cooling systems, 378; insoluble organic, 494; nomenclature and classification, 380; phosphate–chromate, 378; plant for trials, 492; review, 492; thermodynamic and electrochemical study, 494; types and application, 379; volatile, 378
Corrosion Prevention, boilers, 493; electrochemical, methods, 493; packaging, 494
Corrosion Protection, buried metal, 494; buried steel, 379; by cold galvanizing, 108; iron and steel, review, 492; metal articles, American specifications, 380; offshore steel piling, 243; open-hearth furnaces, by electrolytic polishing, 109; in ship construction, 108; sintered parts, 481; structural steel, with sprayed aluminium, 109; use of bitumen, 108; use of metallic zinc, 108
Corrosion Resistance, copper-nickel steels, 372; intergranular, Cr–Ni–Ti steel, effect of heat-treatment, 106; microscopic prediction, 493; molybdenum, 357; oxide coatings, 366; petroleum-type coatings, 244; stainless steels, 379; steel, effect of nitrogen, 371; steel, use of Al coating, 98; tin alloy coatings, 98
Corrosion-Resistant Alloys, chromium–molybdenum–nickel alloys, 357; molybdenum-containing, 357
Corrosion-Resistant Steel, boiling nitric acid test, 109; for castings, 224; low-alloy, 493
Corrosion-Resistant Steel Castings, metallurgy and foundry practice, 222
Corrosion Tests, accelerated, survey of methods and specifications, 107; apparatus for quantitative, 107;
Corrosion Tests—*continued*
design and interpretation, 377; installation for, 492; plated coatings, 492; problems involved, 379; salt fog, 379; salt spray, of cadmium, 98; stainless steel, intercrystalline, 493; stainless steel, microscopic, 493
Cor-Ten Steel, use for plant and vehicles, 380
Costs, cleaning, 234; cold-forming, advantages and disadvantages, 94; corrosion prevention, 377; cupola, 472; furnaces for iron foundry, 223; heat-treatment furnaces, 93; open-hearth plant, calculations, 356; refractories for malleable-iron melting, 83; *see also* Economics
Counter, radioactive, for prospecting in Brazil, 112; tube, with annular diaphragm, 243
Cowper Stoves. *See* Blast-Furnace Stoves
Crack Detection, penetrant-dye method, 242; use of gamma rays and ultrasonics, 371
Cracking, cast-iron moulds, theory, 221; coke, 352; corrosion, 377; craze, 385 (*Paper*); in hardened steels, 228; hot, in welds, 364; hot, of welds, effect of H_2, N_2 and O_2, 364; hot, of welds, influence of Mn, 364; iron castings, effects of extraneous elements, 472; laboratory tests, 482; martensite structures, 489; sensitivity, evaluation of, 238; stress-corrosion. *See* Stress-Corrosion Cracking; surface, 407 (*Paper*); in weld metal, 232
Cracks, depth measurement by Sedac, 370; edge, photoelastic stress analysis, 482; grinding, 388 (*Paper*); prevention by overlays of notch-tough weld metal, 97; rolling, grinding, and quenching, 367; slow-cooling, carburizing, 473
Cranes, control systems, 363; electric overhead travelling, 231; instruments, 231; ladle, 410-ton, 476; lubrication, 96; motor stability, 363; overhead maintenance, 231; permissible stresses for structures, 231; preventive maintenance, 96; runway design, 477
Crankshafts, fatigue failure, 368; flame-hardening machines, 361; forging technique, 474; surface hardening, 361
Craze-Cracking, 385 (*Paper*)
Creep, accelerated, theory, 485; in bonded electric strain gauges, 485; canvas laminate, 101; chromium–molybdenum steels, 240, 485; curves, nature, 104; definition, 104; deflection, in beams, 101; deformation and recovery, 103; effect of alloying, 485; effect of changing loads, 485; effects in solid solutions, 485; fracture, 485; fundamental principles, 240; high-temperature, non-ferrous metals, 485; high-temperature, structural hardening in low-alloy steels, 104; at high temperatures, symposium, 485; metal crystals, 483; nodular cast iron, 223; prediction in bending, 101; properties at high temperature, 368; properties of metals, 484; refractories at high temperature, 468; refractories under load, effect on checker performance, 84; resistance, evaluation methods and influence of C, Cr, Mn, and W, 104; rupture properties, of cold-worked type 347 stainless steel, 103; rupture properties, stainless steels, effect of composition and structure, 103; steady-state, theory, 101; tensile. *See* Tensile-Creep Properties, 485; tube steels, influence of vanadium, 238
Creep–Resistant Alloys, basic principles, 485
Creep-Resistant Steel, chromium steels, for use in steam power plant, 122 (*Paper*)
Creep-Rupture Testing, pyrometric procedure, 487

Creep Tests, on checker brick, 84; chromium–molybdenum–nickel steel, 105; cold-worked niobium-stabilized stainless steel, 103; on Cowper stove checkers, 84; equipment, 104; fundamental principles, 240; machine in vacuum furnace, 468
Crucible-Furnace, steelmaking development in Japan, 356
Crucible Steel Co., die steels, 381; hose couplings for rolls, 475; rolling of transformer core steel, 230
Crystal Boundary Hardening, 106
Crystals, adaptor for X-ray goniometric studies, 487; alkali halide, vacancies, 373; alpha-iron, corrosion in dilute acids, 108; anisotropic, dislocation energies, 107; creep, 483; geometry of austenite-martensite transformation, 375; growth, 374; growth, effect of impurities and imperfections, 373; growth, molecular phenomena, 105; influence of dislocations on mechanical properties, 483; iron, effects of structure on mechanism of oxidation, 490; iron-silicon, polygonized, dislocation in, 107; martensite, growth velocity, 105; orientated, in magnetic sheet, 103; radiation, disarrangement, 373, 374; single, high-purity iron, tensile properties, 105; single, shear-stress determination, 373; slip, during creep, 485; twin, of deformation, 374
Cup Drawing Test, scale effect, 144 (*Paper*)
Cupferron, use in separation and direct determination of Al, Fe and Ti, 245
Cupolas, charging, electromagnetic, 223; charging, mechanization, 473; coke for, 353; coke consumption, 223; cold-blast, 472; combined coke and oil firing, 222; combustion, 360; costs, comparison of water-cooled and acid-lined, 472; dust collection, 471; dust emission rates, influence of design and operating factors, 89; explosion in, 471; hot-blast, 222; hot-blast, development in Europe, 470; for iron foundry, comparative studies, 223; tuyere for oxygen blowing in forehearth, 471; water-cooled, "Equiblast," 223; with water-cooled linings, melting in, 89
Cutting, autogenous, of pipe, 478; distribution of shear-zone heat, 233; lubricants, efficacy, 97; measurements and interpretation, 476; oxy-propane, 96; use of oxygen, 469; *see also* Flame Cutting; Oxygen Cutting
Cutting Tools, nitriding, 227; promotion of good life, 233; temperature analysis, 233; testing, 489; wear, radioactive isotope study, 233; wear resistance, investigation by radioactive isotopes and irradiation, 97
Cyanides, determination in electroplating solutions, colorimetric, 244; effluent disposal, 235; in plating wastes, treatment, 99
Cyclosteel Process, 117 (*Paper*)
Cylinder Blocks, cast, residual stresses in, 225; casting, 92
Cylinder Liners, production, 359
Cylinders, engine, microhardness determination, 488; engine, porous chrome hardening, 235; quenched steel, internal-stress determination, 368

Dana Corp., continuous heat-treatment plant, 360
Debye-Scherrer Lines, measuring with tube counter, 243
Decarburization, carbon distribution, 490; decarburized zone of alloy steels, microstructural observation, 243; of iron–4% carbon alloys, 355; reaction of carbon and oxygen in liquid iron, 473
Decomposition, martensite, first stage, 106
Deep Drawing. *See* Drawing
Deep-Drawing Steel, internal cohesion, 489
Defects, crystalline solids, report of conference at Bristol University, 374; ingots, 474; lattice, review, 374
Deformation, appearance of twin crystals, 374; blooming mill, stereoscopic examination, 95; distribution in forging, 474; double-cone investigations, 104; in failure of machine parts, 487; influence on chemical polishing of austenitic Cr–Ni steels, 234; measurement, errors in tensile tests, 100; measurement in residual-stress determination, 368; methods, review, 104; monocrystals, role of films, 488; permanent resistance of materials to, 100; plastic, in low carbon steels, 238; plastic, residual stresses due to, 483; plastic, of steel, inertia in, 238; plastic, in tensile tests, 483; of plastic metals, in tensile and hardness tests, 482; rate, influence on tensile test results, 238; rolling in continuous mill, 476; steel, under influence of internal blisters and cracks, 483; in tensile tests at high rates, 368; torsional, electrical measurement, 239; total, determination from X-ray photographs, 240; transverse, measuring devices, 483
Degassing, metals, study, 359; vacuum, titanium, 360
Degreasing, agents, testing, 365; Nitec process, 98; systems, and selection, 97
Del Rey Mining Co., Ltd., St. John, mining activities, 80
DEMAG-Humbolt Low-Shaft Furnace, 84
Demineralization, use in steam-raising plant, 108
Density, dislocation, 243; distribution in powder metal compacts, 481; effect of differences on path of jets, 225; moulds, instrument for, 472
Deoxidation, ball-bearing steel, 356; in basic converter, 218; effect on magnaflux test, 241; hydrogen of vacuum-melted alloys, 359; M252, vacuum-melted, 359; malleable iron, 222; review, 357
Department of Scientific and Industrial Research, heat bibliography (1948–52) (*Book*), 247
Dephosphorization, in converter process, 219; iron, with lime, 220; liquid iron with slag, 470
Depolarization, mechanisms, 491
Descaling, electrolytic, 234; with hydrogen peroxide solution, 98; mechanical, of rolled products, 98; rolled material, by flame cleaning, 234; with sodium hydride, 363; surface condition during, 234; thermodynamics of, 363; titanium and stainless steel, 233
Deseaming, use of oxygen, 469
Design, blast furnaces with thin-walled shafts, 84
Desulphurization, in basic converter, 218; coke-oven gas, 215; of iron, in electric furnace, 217; molten iron with slag, limiting stages, 220; of molten pig iron with pulverized lime, 355; of pig iron, with calcium carbide, 216; in slag-metal systems saturated with C, 355; soda-ash, at nine works, 356; steel, with soda ash, 220
Detrex Soniclean Process, 233
Die Blocks, for closed die forging, 474; forging, furnace for, 360; radiant-heating, 93
Die Casting, advantages and limitations, 100; vacuum metallizing, 236
Die Forging, closed, die block for, 474
Die Stamping, combined with machining, 474
Die Steels, application for aircraft structures, 381
Dies, for bending, design, 362; cold extrusion, interference fit and stresses, 229; craze-cracking, 387 (*Paper*); drawing, for stainless steels, 475;
Dies—*continued*
piercing, inverted-type, 474; press forming, selection of material, 111; sectional, 474; tool steel, properties and treatment, 475; wear, study, 488; *see also* Wire Drawing
Diesel Engines, castings, 472
Differential Thermal Analysis, application to fuel science, 352; clays, 354; preparation of clay samples for, 83; refractory materials, use of portable unit, 371
Diffusion, carbon in metals, use of isotope C^{14}, 246; cathodic hydrogen into iron, 371; chromium, 479; clad steel, 494; coefficients, of elements in ferrite, determination, 243; coefficient of hydrogen, electrochemical determination, 102; copper in iron, 371; couples, surface topography, 374; grain boundaries, structure and anisotropy, 374; iron-chromium system, 375; metallic, role of impurities, 373; nitrogen in silicon iron, 106; oxygen through solid iron, 102; role of dislocations and boundaries, 374; role in gasification, 353; surface, review, 383
Dilatometer, improved sensitivity, 371
Dilatometric Curves, graphical-analytical treatment, 242
Dinas-Roofed O.H. Furnace, 470
Direct Processes, 86, 217
Discs, blanking, 474; centrifugal-casting machine for, 91
Dislocations, 373; activation energy problems, 374; ageing of dislocation arrays, 102; aluminium–copper alloys, 374; densities, 243; effects of, 373; energies, in anisotropic crystals, 107; f.c.c. lattices, 374; f.c.c. metals, sub-structures and networks, 374; germanium, electrical effects, 374; hexagonal networks, 374; influence on mechanical properties, 483; jogs, 374; sites, in polygonized iron–silicon crystals, 107; source types, 374; theory, 482; theory and applications, 106; velocity, 102
Disorder, application of theory of, to non-scaling alloys, 367
Dissolution, metals in nitric acid, mechanism, 109
Distillation, vacuum, of non-ferrous metals and alloys, 360
Distortion, ball-bearing steel after heat-treatment, 93; hardened steels, 228; prevention in rolling, shearing, bending, and arc welding, 96
Dolomite. *See* Refractory Materials (Dolomite)
Dolomite–Tar Mixtures, 467
Drawing, 94, 228, 362, 474; cold, semi-formed stock by powder metallurgy, 100; cup, test, scale effect, 144 (*Paper*); cylindrical shells, 94; deep, differential annealing for, 227; deep, properties of steel strip, 369; deep, sheet metal, 94; deep, tests, hardening in, 484; plug, steel tubes, 362; tube, plant at Pacific Tube Co., 229; tube, stresses, 229; tube, theory, 229; tubes and sections, 475
Dressing, cold, effect on cold brittleness of rail steel, 241
Driers, enamel, 366
Drill Pipes, corrosion, 108
Drills, twist, influence of carbide formation, 369
Drop Forging, hammers, construction, 228
Drop Forgings, manufacture in motor industry, 362; manufacture of small products, 362
Drying, enamel, 366
Ductile Cast Iron, flame hardening, 361; hardenability, 223; heat treatment, 360; in Kennedy valve tests, 496; press parts, 362; relationship between mechanical properties and structure, 89
Ductile Fracture. *See* Fracture
"Ductiliron", manufacture, 223

Ductility, aluminium coatings, 366; austenitic stainless steel, influence of strain rate and temperature, 101
Dudelange (ARBED), 7-stage gas turbine for electric generation, 214
Durgapur, steel project, 355
Dust, collecting system in sintering plant, 467; collection methods, 467; control and ventilation in foundry, 471; in construction of recuperators, 214; cupola, collection, 471; cupola, influence of design and operation on emission rates, 89; dispersal of particles from elevated sources, 354; distribution in atmosphere, 353; effect on health in industry, 111; extractors and precipitators, 218; measurement in industrial gases, 215; silica, employers' obligations, 88; siliceous, determination of dissolved silica, 110
Dyeing, corrosion problems, 108
Dynamo Plates, properties, 496

Ebbw Vale, plant modernization, 95
Economics, 111, 382, 496; comparison of O.H. and electric furnaces, 356; costing in German ferrous industry, 111; costing and general management factors, 111; long- and short-term prediction in steel industry, 496; steel industry in Russia, 496; steel market, 468; steel tariff, 382; steelmaking processes, 217; structural steelwork, 495; vacuum melting, 359; *see also* Costs; Iron and Steel Industry
Education, 210, 464; courses for foremen, 496; inter-works schools in Russia, 383; sheet-metal work, examination requirements, 381
Effluents, determination of lead, colorimetric method, 110; disposal of acids and cyanides, 235; disposal problems, 383; electroplating, treatment, 365; finishing, disposal, 365; finishing, disposal, instrumentation in, 99; plating, treatment plant, 99
Elastic Constants, at high temperatures, 484; measurement by vibrations in beams, 482; ultrasonic–diffraction determination, 370
Elastic Properties, grey cast irons, 482
Elasticity, hypo-, and plasticity, 103; magneto-, of polycrystalline iron and nickel, 238
Elasticity, Modulus of, acoustic determination, 237; grey cast iron, calculation, 482; relation to elastic after-effect, 482; sintered materials, 240
Electric Furnace, arc, 225; arc, automatic cooling regulation, 220; arc, basic, building with binderless dolomite, 220; arc, basic, high-alloy steel melting, 87; arc, design and rating, 220; arc, economics of, 356; arc, electrode pastes, 217; arc, fume collector on, 231; arc, gas purging of molten bath, 356; arc, hydrogen control, 356; arc, improving steel production, 470; arc, melting of alloy-steel ingots for jet engines, 87; arc, melting methods, 87; arc, review, 357; arc, system capacity for 3-phase, 87; arc, use of graphite electrodes, 220; blowing with carbon monoxide, 220; coreless induction, mains-frequency, for melting scrap and swarf (Birlec. Ltd.), 356; coreless induction, mains-frequency (Otto Junker G.m.b.H.), 356; Demag–AEG, 10–12 t, at Barcelona, 220; duplex process, 220; high-frequency, 225; induction, core and coreless, 87; induction, coreless, mains frequency, 471; induction, coreless, operating experience, 470; induction, high-vacuum, 359; induction, hydrogen evolution, 219; induction, review, 357; induction, use in determination of C and S in steel, 110; induction crucible, coreless, linings, 83; for
Electric Furnace—*continued* ironfoundry, comparative studies, 223; ironmaking, 469; manufacture of ferro- and silico-manganese, 88; nitrogen content of steel in, effect of slag type, 470; production of pig iron, 85; refractories, monolithic and shaped, 468; resistance, 225; resistance, double-winding, construction, 367; resistance, high-vacuum, 359; resistance, review, 357; resistance, stabilization of temperature conditions, 356; sintering, 481; steelmaking development in Japan, 356; use of higher voltages, 87
Electric-Furnace Practice, desulphurization of iron, 217; smelting of ilmenite concentrates, 217; smelting of titaniferous ironsands, 217
Electric Motors, d.c., design, 231
Electric Power Supply. *See* Power Supply
Electric Utility Systems, corrosion problems, 108
Electrical Aspects, kilovar, killowatt and voltage control, 231
Electrical Equipment, ventilation, 363
Electrical Properties, effects of dislocations in germanium, 374; influence of impurities and imperfections, 373
Electrical Resistivity, manganese steel, 286 (*Paper*); steel, effect of quenching, 6 (*Paper*); steel, effect of quenching and tempering, 10 (*Paper*)
Electrical Steels, 220
Electrochemical Society, vacuum metallurgy symposium, 359
Electrochemistry, 380, hydrogen sulphide, corrosion study, 243; stainless steel in sulphuric acid, 244
Electrodeposited Coatings, adhesion test, 235; corrosion tests, 492; organic finishes, 480; protective and protective/decorative, selection, 235; stop off, strippable, 480; structure, 98; structure and properties, 234; *see also* under specific types of coating
Electrodeposition, change of cathode polarization, 365; electro-zinc coated steel, 236; progress and developments in Belgium, 99; review, 99; in Switzerland, 99; in ultrasonic field, 365
Electrodes, cathodically polarized, potential, 491; graphite, in electric arc furnace, 220; potentials, 243; Söderberg, plastic properties, 87
Electroless Plating, nickel, 480
Electrolysis, mechanism, 380; Pt/HNO_3, 491; steel/HNO_3, 491; stray current in Victoria, 378
Electrolytic Charging, steel, hydrogen occlusion and equilibrium hydrogen pressure, 102
Electrolytic Zinc Co. of Australia Ltd., corrosion of boilers, 378
Electromagnetic Suspension, molten zone, 111
Electrometallurgy, notes on, 225; review, 357
Electron Chemistry, applications in metallurgy, 372
Electron-Diffraction Studies, oxide films on iron surface, 379; oxide structures, 488
Electron-Microscope Studies, alloy carbides precipitated in 4th stage of tempering, 258 (*Paper*); carbide phase changes on tempering Mo steel, 377; collodion replicas, 104; Formvar replicas, 104; high-vacuum furnace and heat-treatment atmospheres, 359; oxide structures, 488; porous refractories, 489; progressive etching effects on pearlitic steel, 107; slip-band extrusion, 372; tempering of plain carbon steels, 148 (*Paper*)
Electron Microscopy, chromium–molybdenum–nickel steel, 105
Electronic Computers, use in steelworks, 383
Electronics, in communications, 487
Electrophoresis, deposition of coatings, 479
Electroplating, adhesion test, 235; alloy, 235; application of Kirkendall effect, 479; application of water purification with activated carbons, 479; barrel, at Bifurcated and Tubular Rivet Co., Ltd., 480; barrel, zinc, 235; cleaning for, 234; copper anodes in acid and cyanide baths, 480; developments, in U.S., 99; maintenance, 99; in Netherlands, 99; over-riders, 479; porous metal, 235; progress and trends in Germany, 99; sintered parts, 481; standards and requirements, 235; throwing power, 98; use of electronic irradiation, 479; use of low-frequency vibration, 479; use of virtual electrode, 478; vats, temperature control systems, 99; waste problems, 365; wastes, ion exchange treatment, 365
Electroplating Solutions, analysis by potentiometric method, 479; analysis, spectrographic method, 495; colorimetric determination of free cyanide, 244; level control, 479; nickel, determination of boric acid, 244; nickel-chloride and sulphate, 235; purification by ion exchange, 479
Electro-Spark Machining, 233
Electrostatic Coatings, 480
Elektra Spark-Machining Equipment, 478
Elfström Generator, 473
Elin Haferguth Welding Process, 232
Elongation, discontinuous, of austenitic alloys at high temperatures, 238
Embossing, sheet metals, 362
Embrittlement, ageing, use of zephirol etch, 490; boilers, 379; effect of environment, 488; malleable iron, 90
Emissivity, refractories, determination, 468
"Emma" Coking Plant, 214
Emulsions, oil, action in rolling mills, 95
Enamel, colour stability, 237; glass-bonded vermiculite, for insulation, 480; titania-opacified, effect of mill additions, 98; vitreous, firing, 366; *see also* Coal Tar/Enamel Coatings
Enamel Glasses, viscosity, 236
Enamelling, bath tubs, quality control, 236; causes of porosity and blistering, 237; effect of hydrogen permeability, 237; iron castings, 98; iron surfaces, 237; porcelain, for gas-stove parts, 99; sheet iron and steel, report of course, 366; technical problems, 234; vitreous, effect of oxygen content, 98; vitreous, pretreated steel sheet, 98; vitreous, process control, 98; vitreous, on welded steel, 480
Energy, of constrictions, 374; stored, in cold-worked metals, 374
Engine Cylinders, porous chrome hardening, 235
Engine Face Plate, casting, 359
Engine Valves, Aldip coating process, 366; alloy-steel, aluminium spraying, 236
Engineering, department in steel plant, 231; developments in iron and steel industry, 216; hydraulic, 216; site, corrosion and wear precautions, 380
Engineering Construction, scientific approach, 111
Engineering Services, at Jones and Laughlin's Aliquippa Works, 354
Entropy, discussion on Frank Read model, 483
Environment, effect on metals at high temperature, 488
Epoxy Resin, patterns, 224
"Equiblast" Cupola, 223
Equilibrium Diagrams, gold–nickel, 491; iron, potential- pH, 380; iron–CO_2–H_2O, potential-pH, 380; iron/iron-phosphide/tungsten-phosphide, 377; iron/lime/oxygen/phosphorus, 220; iron-molybdenum, 491; iron–nickel, 491; iron–palladium and iron-platinum alloys, 105; iron–phosphorus–tin, 107; iron–phosphorus–vanadium, 107
Equiverse System, 93, 225, 360

Erosion, catalytic cracking plants, 378; cavitation, 493–494; mechanisms, 493; sand, testing machine, 241
ERS Gauge. *See* Strain Gauge
Escher-Wyss Co., test method for cemented carbides, 233
Etchants, sodium thiosulphate for cementite and phosphorus, 373; zephirol, 490
Etching, double, 490; in gaseous discharge, 490; influence of anodic polarization, 489; Künkele's method, 490; macro, iron and steel, 105; progressive, effects on pearlitic steel, by electron microscope, 107
Ethyl Chloride, influence on tensile properties of wires, 484
Europe, iron and steel industry (1955), 383; low-grade ores, mining and dressing, 213
European Coal and Steel Community, functions, 382
Exhaust Manifold, moulding and coring, 358
Exhibition, Bessemer Centenary, at Offices of Iron and Steel Institute, 118; iron and steel gallery at Science Museum, 121
Explosion, cupola, 471
Explosives, effects produced with lined cavities in steel, 239
Extensometer, electrical, 100
Extrusion, advantages and limitations, 100; cold, of artillery shells, phosphate coating retention, 98; cold, dies, interference fit and stresses, 229; cold, lubrication problems, 229; hot, of steel, Ugine-Sejournet process, 94; impact process, 475; manufacture of sections by powder metallurgy, 100; slip-band, 372; steel, by glass lubrication, origin, 94; theory, 475; tool problems, 94; Ugine-Sejournet process, 475; use of glass as lubricant, 229

Factories Act (1937), silica dust, 88
Failures, delayed, in steel, influence of hydrogen embrittlement, 102; metal, microscopic examination, 100; in steelworks, theoretical analysis, 88
Fans, sinter-plant, effect of air leakage, 428 (*Paper*)
Fatigue, crankshaft, failure, 368; failure, 240; failure of carbon steel cable, 368; machine parts, 240; properties of metals, 484; properties, variation over individual casts of steel, 178 (*Paper*); of rails, magnetic flaw detector trials, 240; review, 240; size and shape effects, statistical theory, 103; static, high-strength steel, 103; strength of bolted joints, 369; strength, effect of induction hardening, 483; strength of SAE 4140 steel, effect of Cr deposits, 479; strength of surface layers and coatings, evaluation, 369; theories, 240; theory in relation to fracture, 102; thermal aspects, 240; welded components, 232; X-ray scattering study, 240
Fatigue (Human), under hot and humid conditions, 112
Fatigue-Testing Machines, adaptation for corrosion-fatigue tests, 483; Amsler High Frequency Vibrophone, 483; Moore type, 482; with polyharmonic stress-change cycle, 483; for steel cables, 368
Fatigue Tests, 240; automatic control, 483; chromium steel springs, 246; Comet airliners, 487; low-alloy steels, 101; minimum scatter criterion, 101
' Fauderias ' Splitting Mills, 382
Ferrite, crystals, effects of alloying elements, 482; delta, metallography, 57 (*Discussion*); derivation of orientation of phase, 284 (*Appendix*); determination of diffusion coefficients of elements, 243; effect of tungsten on nucleation and growth, 106; *see also* Austenite-Ferrite Equilibria
Ferrite—*continued*
Ferrites, 481; analysis, 381; alkali, preparation, 481; broad-band non-reciprocal phase shifts, 481; frequency doubling, 481; nickel, effect of Mn and Co on resistivity, 481; temperature behaviour of ferrimagnetic resonance, 481
Ferro-Alloys, production, 88, 221; production in blast furnace, viscosity of slags, 221
Ferroboron, influence of physico-chemical state on optical spectrum, 109
Ferrochromium, effect in charge of stainless steel heats, 357
Ferrocoke, scheme for production and use, 352
Ferromanganese, manufacture in electric furnace, 88; production, slag-metal equilibria, 88; production, using Chiatursk carbonate manganese ores, 221
Ferronickel, martensite transformation, 375, 376
Ferronickel Alloys, irreversible, spontaneous magnetogalvanism and magnetization, 241
Ferrosilicon, grain-boundary displacement, in secondary recrystallization, 490; influence of physico-chemical state on optical spectrum, 109; stability, 88
Ferrosilicon Alloys, casting, 88
Ferroso-Ferric Oxide, reaction with copper oxide, 107; *see also* Iron Oxides
Ferrous Oxide, chemical composition, variations, 107; composition and stable temperature limits, 379; rate of reduction from $CaO–SiO_2–Al_2O_3$ slag, 469
Files, use in hardness tests, 103
Films, adsorbed, of gases and vapours, 383; analysis by X-ray emission spectrography, 488; cathodic protection in sea water, 494; ferromagnetic materials, preparation and properties, 103; iron-nickel, magnetic domains, 487; metal, vacuum-evaporated, adhesion, 99; oxide, constitution, 379; role in deformation of monocrystals, 488; silver, mechanical-strength determinations, 484
Filtering, chromic acid solutions, 479
Finishes, organic, for electroplated work, 480
Finishing, in Canada, 99; corrosion problems, 108; in Finland, 99; in New Zealand, 99; progress in Sweden, 99; progress and trends in Germany, 99; review, 99; review of developments 97; sheet, control problems, 95; sheet, equipment, 24 (*Paper*); shells, automatic, 98; sintered parts, 481; trends, in India, 99; trends and advances, 99; waste disposal, 365
Finland, finishing developments, 99
Fire, prevention and protection methods, 496
Fireclay. *See* Refractory Materials (Fireclay)
Firth, Thos., and John Brown Ltd., steel-foundry facilities, 92
Firth Wire Co. Ltd., continuous strand annealing and galvanizing plant, 365
Flakes, formation in low-alloy steels, relation to hydrogen, microstructure, and stress, 102
Flame Cutting, 96, 232, 364, 477; accuracy and tolerance, 233; applications in steelworks and rolling mill, 233; effect of heat and stresses, 96; high-alloy steel, 96; *see also* Cutting; Oxygen Cutting
Flame Hardening, cams and gears, 473; cast iron, 226; ductile irons, 361; grey cast iron, 226; methods, 227; 361; Peddinghaus machines, 361; use of propane, 96
Flame-Plating, carbide, in powder metallurgy, 100
Flame Radiation Research Joint Committee, performance trials at Ijmuiden, 214
Flame Spraying, cermets, on to engine components, 236
Flames, Bessemer, spectrum, 355; carbon-monoxide–hydrocarbon–air, correlation of equilibrium atom and free radical concentrations, 81; carbon-monoxide–hydrocarbon–air, stability, 81; coke-oven-gas, increase of emissivity, 214; geometry, in industrial heat processing, 352; in open-hearth furnace, 219; radiation, research, 467; radiation research at Ijmuiden, 82; reaction zones, internal structure, 352; research at Ijmuiden, 352; sulphur distribution with slag in open-hearth furnace, 87; theory of phenomena with chain reactions, 81; transient-temperature measurement, 82; turbulent jet diffusion, radiation, 214
Flanging, 228
Flow, aerodynamic, in iron and steel works 82; air, in beds of granular solids, 355; experiments in studying kinetics, 353; gases, in O.H. furnace, 219
Flowturning, 94
Flue Gas, combustion, analysis and pollution, 213
Fluidity, cast iron, effects of composition and pouring temperature, 92
Fluids, non-inflammable, 231
Fluorography, above 150 kV, 370
Fontana Blooming Mill, 475
Ford Motor Co., Ltd., coil annealing furnaces, 473; compaction moulding process, 358; gas carburizing furnace, 361; vacuum and pressure melting of iron alloys, 359
Foremen, training courses, 496
Forgeability, steels, 94
Forges, axles, 383; Mirandaolo, 382
Forging, 94, 228, 362, 474; closed-die, design, 228; development in Japan 228; die, closed, die block for, 474; die blocks, furnace for, 360; equipment at Westinghouse Electric Corp., 94; integral grain flow, principles and uses, 94; internal stresses, 362; plant, induction heater, 474; precision, in forge-roll process, 363; press, of axle shafts, 362; spheroidal graphite cast iron, 89; tool steel, 228; tyres, 474; upset. *See* Upset Forging
Forging Furnaces, investigations to improve gas-fired operation, 93
Forging Presses, design and construction, 188 (*Discussion*); hydraulic systems, 198 (*Discussion*); Schloemann hydraulic, 228
Forgings, automatic heat treatment, 360; carbon steel, segregation flaws, 474; comparison with steel castings, 357; control with metallographic microscope, 372; crankshaft, 474; effect of heat-treatment, 489; failures, 228; mechanical properties, 474; rudder, 474; supersonic testing, 238; turbine shaft, failure, 487; upset, methods and design, 474
Forming, cold, economic advantages, 94; cold, of structural sections, 230; cold, technological aspects, 94; cold roll-, of light-gauge sections, 94; hot, use of multi-jet torch for heating, 475; low-temperature, 485; operations, 228; operations, research, 94; stainless steel, 362; stretch-, Hufford Carousel machine, 94
Formvar, electron-microscope replicas, 104
Forsterite. *See* Refractory Materials (Forsterite)
" Foseco Feedex " Hot Tops, 221
Foundry, activity sampling, 222; analysis, photometric methods, 494; automation in Norway, 92; buildings and plant, 92; cleaning and de-coring, 472; Cornish, nineteenth-century, 382; defects, 359; design and layout of buildings, 358; dust control and venti-

Foundry—*continued*
lation, 471; equipment, developments, 358; Firth, Thos., and John Brown Ltd., 92; fumes, formation and dispersal, 471; furnaces, 223; General Motors Corp., Chevrolet Motor Division, 358; grey iron, productivity and factory performance, 92; grey iron, quality control, 357; induction heating (low-frequency), 92; investment-casting, in South Africa, 91; knock-outs, dust control, 471; lighting, 471; master alloys, 223; mechanization, 357; mechanized, at General Metals Corp., 92; mechanized, for grey iron castings, 358; Missouri Valley Conference (1955), 357; practice, 88; practice, 222, 357, 470; practice, Colombia, South America, 111; practice, progress, 470; practice, New Zealand, 357; practice, stainless alloys, 222; problems and principles, 222; production-design teamwork, for cylinder-block casting, 92; production standards, 357; progress, 357; refractory applications, 83; Russian industry, 470; safety and health, 471; silica dust, employers' obligations, 88; Société Mancelle de Fonderie, 358; special irons and steels, and application to mineral industry, 223; steelmaking furnaces, small, 471; Stewarts and Lloyds, Ltd., Adelaide, 470; stockyard, mechanization, 473; transport, aids for load attachment, 96; use of radioactive isotopes, 488; Waunakee Alloy Casting Corp., 359

Fox, Samuel, and Co., Ltd., spring manufacture, 362; watch spring manufacture, 372

Fracture, alpha iron, 374; creep, 485; ductile, theory, 485; effect of microstructure on morphology of, 239; at high temperatures, symposium, 485; impact bending, mechanism, 239; inoculated cast iron under biaxial stresses, 89; intercrystalline, 485; iron, effect of added elements, 484; machine parts, 487; resistance to, formulæ for, 239; steel castings, types, metallographic study, 90; theory in relation to fatigue, 102; types produced in steel targets from high-explosive charges, 239; *see also* Brittle Fracture

France, blast-furnace construction, 468; carbonization development, 214; contributions to metallurgy, 246; ingot casting practice, 220; iron and steel industry, 111, 382; quality control of metallic coatings, 99; research on impact strength and brittle fracture, 238; units system, 367; use of Edgar Allen steels, 92; use of Thomas steel for rails, 111; uses and deposits of dolomite, 467

Free-Cutting Steel, 478, analysis, spectrographic, effects of thermal treatment and deformation, 491

Fretting Corrosion, mechanism, 492; preventive measures, 494; review, 492

Friction, chromium deposits, antifriction properties, 103; heat, 370; internal, apparatus for measurement, 238; internal determination of alpha-phase boundaries in Fe–N system by, 302 (*Paper*); internal, effect of nitrogen in pure iron, 102; internal, relation to temper brittleness, 369; in powder metallurgy, 100; properties of S.G. cast iron, 223; recent experiments, 241; testing machine, furnace attachment, 371

Frits, formulation, 236; titanium, for coloured enamels, 237

Fritting, powders, 366

Fuel, application of differential thermal analysis, 352; ash, corrosion by sodium sulphate, 243; economy in stoving, 480; gaseous, effect of composition changes, 353; gaseous, for industrial heat processing, 352; liquid, gasification, 467; oil, addition to coke mixtures, 214–215; for open-hearth furnaces, 87; preparation, properties, and uses, 81, 213, 351, 466; resources, Germany, 352; solid, gasification, 467; statistics, world, 214

Fuel Oil, atomization methods in open-hearth furnace, 82

Fume, foundry, formation and dispersal, 471; in welding, with lime electrodes, 232

Fume Collector, on electric arc furnace, 231

Furnaces, annealing. *See* Annealing Furnaces; atmospheres, analysis (recorders), 495; atmospheres, "Equiverse" control system, 225; for attaching to friction-testing machine, 371; blast. *See* Blast Furnaces; bloomery, VEB Maxhütte, 473; car-hearth type, 225; continuous, mechanized, 225; construction, in relation to temperature, 93; construction and uses, 94; design, application of model techniques, 225; efficiency calculations, 473; electric. *See* Electric Furnaces; enamel-firing, 366; energy losses 473; forging, 93; foundry, 223; gas, for porcelain enamelling of stove parts, 99; gas carburizing, 361; gas-fired, automatic heat control, 473; gas-fired, automatic temperature control, 354; gas-fired, for forging die blocks, 360; heat-treatment. *See* Heat-Treatment Furnaces; heating. *See* Heating Furnaces; high-vacuum, evaluation, 359; industrial, natural gas atmosphere, 360; industrial, symposium, 360; low-shaft, operation, 84; malleable iron, refractory costs, 83; metallurgical, theory, calculation and design, 93; "mock-up", 87; non-scaling, billet, 360; oil-fired, automatic temperature control, 354; open-hearth. *See* Open-Hearth Furnaces; pusher-type, gas-fired, 93; reheating. *See* Reheating Furnaces; reverberatory, conversion to oil and pulverized coal firing, 471; reverberatory, heat transfer, 223; rotating hearth, in tube industry, 360; sintering, 481; solar, refractories, 468; solar energy, 217; steelmaking, small, 471; Talbot, for production of phosphatic slags, 87; vacuum, 87; vacuum, for study of structure, 377; vacuum melting, 359

Fusion, Heat of. *See* Heat of Fusion

Galey Opacimeter, use in converter, 219

Galvanized Iron, zinc removal, 365

Galvanized Steel, welding, 477

Galvanizing, cold, 235; cold, for corrosion protection, 108; continuous hot, of strip, 235; hot-dip steel wire, 235; *see also* Zinc

Gamma → Alpha Transformation, in stainless-steel wire, 274 (*Paper*)

Gamma Radiography, review, 101; safety precautions, 371; spectra of V, Co, Ti, Fe, Cr, Au, Mn, and I, 104; standards for evaluation of metal defects, 101; weld testing, 371; *see also* Radiography

Garringtons Ltd., axle shaft manufacture, 362; metallurgical laboratories, 372

Gas, adsorbed, influence on mechanical resistance of wires, 484; analysis, absorbents for CO, 245; analysis, chromatographic, 245; analysis, Heat Prover, 495; analysis, volumetric, 381; atmospheric, metallurgical uses, 469; blast-furnace, cleaning, 216; blast furnace, effect of pressure on movement, 85; blast-furnace, efficiency in use of, 216; in cast steels, 357; cleaning, 467; cleaning equipment, 467; cleaning plant, 215; composition, effect on utilization of fuel gases, 353; control in coal charge during coking, 352; determination in steels and cast irons by vacuum melting, 110; diffusion from elevated sources, 354; dissolved, elimination in electric arc furnace, 356; distribution in atmosphere, 353; dust content, 215; effect in pig irons and cast irons, 89; effect on structure of cast iron, 472; flow, distribution in blast furnace, 85; flow in open-hearth furnace, 219; flue, analysers, 213; flue, condensates, corrosion by, 379; fuel. *See* Fuels; high-temperature jets, in manufacturing processes, 360; liquid-fuel/coke-oven-mixtures, radiation from turbulent jet diffusion flames, 214; natural, sulphurous, exploitation of deposits, 108; producing equipment, corrosion control, 108; production in Bassin du Nord and Pas-de-Calais, 214; transit times in blast furnace, 18 (*Paper*); in welding with lime electrodes, 232

Gas Burners, design for steelplants, 81

Gas Engines, for blast-furnace blowers at Société Cockerill, 214; electric power generation with blast-furnace gas, 82

Gas Industry, corrosion, 377; steam and power demands, 82

Gas Mains, corrosion protection, 377

Gas Permeability, determination for fire-resistant materials, 354

Gas Producers, design and practice, 215, 353; Heurtane, 353; results on new plant at Société Creusot, 353; Wellman-Galusha, 215

Gas Turbines, aircraft, heat-resistant alloys for, 357; corrosion of stainless steel, by sodium sulphate, 243; effects of elements on Cr–Co–Ni steel for, 242; operation and application in iron and steel works, 82; rotor blades and nozzle veins, fabrication by powder metallurgy, 481; seven-stage, for electric generation, 214; use for blast-furnace blowers, 84

Gas Works, recovery of incandescent heat, 353

Gasification, reactions, role of diffusion and influence of flow pattern, 353; solid and liquid fuels, 467; total, of coal, 215

Gauges, Strain. *See* Strain Gauges

Gears, automotive, heat-treatment, 489; automotive, selection of steel, 489; carburizing steels for, 221; case hardening, 226; flame hardening, 473; hot rolling and testing, 476; teeth and splines, cold rolling, Roto-Flow process, 230; tests, 476; wear, measurement, 370

Gecalloy, magnetic and thermal properties, 103

Geiger Counters, use for measurement of stress distribution, 101

General Electric Co., metals and ceramics research laboratory, 380

General Electric S.A., tungsten plant, 383

General Motors Co. (Buick), stamping and welding of rear axle housings, 228–229

General Motors Corp., Aldip coating process, 366; Alumicoat process, 98; Chevrolet Motor Division foundry, 358; mechanized foundry, 92

German Democratic Republic, steel production developments, 355

Germanium, electrical effects of dislocations, 374

Germany, costing in ferrous industry, 111; electroplating and metal finishing, progress and trends, 99; fuel and power resources, 352; iron and steel industry, survey, 112; iron-ore pelletizing and sintering practice, 81; manufacture and service performance of rails, 111; raw materials, 111; research on hot-blast stoves, 82; salt baths, production control, 226; semi-continuous casting of steel, 88; steel quality and standardization, 111

Germany, East, mining of iron ores, 466

Glass, containers, 98; lubricant for extrusion, 229; lubrication in extrusion, 94; vacuum metallizing, 236
Glass Furnaces, use of suction pyrometer, 354, 467
Glasses, enamel, viscosity, 236
Gold, neutron-capture gamma-ray spectra, 104; *see also* Iron–Gold Alloys
Gold–Nickel Alloys, equilibrium diagram and solid-state reactions, 491
Grain Boundaries, characteristics, 373; diffusion, structure and anisotropy, 374; displacement during secondary recrystallization, 490; displacement mechanism, 485; influence on behaviour of carbon and nitrogen in α-iron, 102; migration, geometrical coalescence mechanism, 367; mobility along, study, 243; primary austenite, brittleness due to, 486
Grain Growth, after cold working, 489
Grain Size, austenite, determination, 373; austenitic, effect of aluminium, silicon and iron nitrides, 105; carbon steels, 485; spectrochemical determination, 356
Grains, spherical, statistical analysis of structures with, 373
Granulometric Index, application to study of mixer-grinder, 82
Graphite, electrodes, in electric arc furnace, 220; formation on steel surfaces during vacuum heat-treatment, 359; growth in cast iron, 223; influence on spectrographic analysis of alloys, 495; nodular or laminar, mean stress level in metallic matrices of materials containing, 223; secondary, orientation in grey cast irons, 490; size and distribution in cast iron, 225; spheroidization in iron, 223
Graphitization, cast iron, 222; whiteheart malleable cast iron, influence of boron and aluminium, 89
Gravity, effects on solidification of steel, 447 (*Discussion*)
Grease. *See* Lubricants
Grey Cast Iron, anti-friction properties, 223; application of mill casting, 92; bend test device, 238; blowholes, 92; composition for castings, 89; elastic and mechanical properties, 482; foundry quality control, 357; gas holes, 92; heat treatment, 226, 357; heat treatment, sulphating and nitriding, 223; orientation of secondary graphite, 490; penetration into sand cores, 472–473; radiographic and mechanical strain measurement, 240; sampling for carbon determination, 494; selection, 92; structure, properties and applications, 471; surface defects, 92; use of chill and wedge tests, 471
Grey Iron Castings, composition, 89; effect of sand additives on surface finish, 90; mechanized foundry control, 358; metallurgical study and testing, 222; risering and shrinkage, 222; structural anisotropy, mechanical behaviour and standardization, 89
Grinding, barrel, of metal parts, 98; coke, influence on quality, 352; cracks, 388 (*Paper*); enamel, 366; impact, ultrasonic, 364; tests at Malmberget, 478; wet, tests, 468
Grinding Machines, swing-frame, ventilation, 471
Grunewald Vertical Electric Furnace, 473
Gypsum Cement Moulds, plastic patterns, 224

Hägg Iron Carbide, modifications, 109
'Halcomb 218' Steel, 381
'Halcomb 1370' Steel, 381
Halides, alkali, crystals, vacancies, 373
Hall Effect, in permalloys, 370
Hard Facing, Dewrance T.L.B. powder deposition process, 480; electrospark, 361; engineering equipment, 232
Hard Metals, electro-spark machining, 97, 478
Hardenability, 489; boron steel, 361; carbonitrided carbon steel, 103; cast iron, 92; ductile cast iron, 223; Jominy test, 489; Jominy test, reproducibility, 488; tests, 92
Hardening, aircraft components, 226; apparatus, spark temperature, 361; automatic furnace, 360; bainite, of high-speed tool steels, 227, 228; calculations, 228; cast-iron, 361; comparison of American and German methods, 228; continuous, furnaces for, 473; in deep-drawing tests, 484; flame. *See* Flame Hardening; grey cast iron, 226; high-speed-steel tools, 228; high-speed tool steel, 93, 94; induction. *See* Induction Hardening; influence of temperature, 228; internal tension and distortion and crack formation, 228; isothermal, determination of depth of cementation, 228; plant, industrial demands, 94; plant, for motor industry, 93; 'Porus-Krome' process, for engine cylinders, 235; primary, 228; screws, 228; structural, in low-alloy steels for creep at high temperature, 104; structural steels, 227; surface. *See* Surface Hardening; use of aqueous quenching baths, 94; use of time-temperature transformation curves, 228
Hardness, accuracy, of Vickers and Rockwell, 240; alumimides, temperature dependence, 107; carbon steels, at low temperatures, 452 (*Discussion*); cast iron, experiments, 473; changes in pure metals during heating, 240–241; chromium steel, effect of annealing, 107; dynamic, equipment for, 104; grey cast iron, calculation, 482; iron-carbon alloys, 373; low-alloy steels, at low temperatures, 452 (*Discussion*); macro, polycrystalline, of steels, 486; meaning of term and discussion on, 100; micro-, deformed 18/8 stainless steel and aluminium alloy, 106; micro of engine cylinder, determination, 488; micro, monocrystalline, of martensite, 486; micro, in study of solid-state reactions, 486; micro, theories, 486; retention after electrospark hardfacing, 361; scratch, change due to wetting, 241; scratch, effect of wetting, 486; small-load, elastic and plastic components, 103; tool steels, 360; Vickers, relationship with load, 103
Hardness Tests, in ageing study on soft unalloyed steels, 369; apparatus for depth of chill in case-hardened parts, 486; deformation of plastic metals, 482; after frontal quenching, 369; high-temperature, 486; magnetic technique, 487; micro, 369; micro, machine, 103; micro, scatter, use of Tukon machine, 486; new machines and design trends, 487; reducibility, 487; Rockwell, precision measurement of indentors, 487; Rockwell, of sheet, 487; Shore, dispersion of values, 485; small loads, 485; use of files, 103; Vickers, accuracy, 485
Hastelloy R-235, vacuum melting, 359
Head, Wrightson & Co., Ltd., blast-furnace scale cars for Spain, 96
Hearth Blasting, 234
Heat, bibliography (*Book*), 247; content, alloy steel, cadmium, lead, soft iron, iron–phosphorus alloy, and nickel, 372; content, correlation with mechanical properties, 237; content of substances, 372; content curves, automatic recording, 237; economy of utilization, 367; frictional, 370; measurements, errors in, 82; physiological aspects, 112
Heat of Activation, of corrosion reaction for buried iron, 107
Heat-Exchange Fluids, corrosion by, 494
Heat-Exchange Systems, corrosion, 493
Heat of Fusion, aluminium, bismuth, cadmium, indium, lead, thallium and tin, 372; tin, 372
Heat Prover, for gas analysis, 495
Heat Recuperation, theoretical bases, 214
Heat Resistance, relation between temperature and composition, Cr–Ni–Ti alloys, 371
Heat-Resistant Alloys, analysis of welds, 495; casting, analysis, properties and production, 371; for gas-turbine aircraft, 357; for jet power plant, 356
Heat-Resistant Cast Iron, high-silicon, 471
Heat-Resistant Steels, for castings, 224; pickling, non-acid, 97; progress in, 357; thermal stability, 104; weldability, 232
Heat Transfer, continuous reheating furnaces, 360; in coke ovens, calculations, 242; heating furnaces, 473; nuclear reactors, materials for, 381; open-hearth furnace, 360
Heat of Transformation, iron–nickel alloy, 372; soft iron, 372; thallium, 372
Heat-Treatment, 93, 225, 360, 473; accident prevention in plants, 93; applications of Grunewald furnace and Elfström generator, 473; atmospheres. *See* Heat-Treatment Atmospheres; automation, 360; ball-bearing steel, distortion, 93; at Blairsville, 93; cast iron, softening, 227; cast steels, 360; chromium-magnet steel, 360; chromium–molybdenum–nickel alloys, 357; chromium – nickel – titanium steel, effect on corrosion resistance, 106; comparison of American and German methods, 228; continuous, 360; ductile iron, 360; effect on cold brittleness of rail steel, 241; effect on corrosion fatigue of low-alloy Cr–Mo steels, 493; effect on forgings, 489; effect on hysteresis loss in hot-rolled transformer sheet, 241; effect on machinability, 478; effect on response to induction hardening, 361; effect on strength and notch toughness of hot-working tool steels, 101; forgings, automatic, 360; free-cutting steel, 478; gears, 489; for good machinability, 233; grey cast irons, 223, 226; grey iron castings, 357; high-speed-steel tools, 228; hot-work tool steels, 357; inductive apparatus, 226; iron-cobalt alloy, 106; iron powder parts, 481; isothermal, 228; low-alloy steels, 104; low-temperature, 473; magnetic core iron, 226; malleable cast iron, 223, 224; malleable cast iron (pearlitic), 89; malleable cast iron, sub-critical, 90; molten baths and handling mechanism, 226; nickel alloys and stainless steels, plant, 365; nodular cast iron, 224, 469; oxidation-resistant steels, 357; planning of tests, 225–226; plant at Smith-Clayton Forge, Ltd., 361; practice in Japan, 356; rolls, in electric furnace, 93; stainless-steel weld surfaces, 364; steel, 473; of steel, effects of ultrasonics, 93; steel, properties obtained by, 227; steel castings, 93; sulphurizing process, 226; surface carbon content control, 227; tool steel, 228; use of nitrogen, 469; vacuum, graphite formation, 359; vacuum techniques, 359; *see also* under specific types of heat-treatment
Heat-Treatment Atmospheres, for carbon control, 226; design and application, 360; equipment for measurement and control, 227; exothermic and endothermic, 226; "Hi-Nitrogen" generator, 226; high-vacuum, evaluation, 359
Heat-Treatment Furnaces, 93, 225, 360, 473; automatic controlled-atmosphere, bottom-quenching, 473; automatic gas-fired pusher, 360; batch-type, 473; case hardening, 226; continuous, 360; development suggestions, 473; economics, 93; electric element, 360; gas-burner design, 81; hardening,

Heat-Treatment Furnaces—*continued*
continuous, 473; for malleable iron, 224; mechanized, 93; practice, 360; for seamless tubes, 226; use of 'Indugas' preheating chamber, 93
Heaters, chromium–nickel alloys for, effect of strain on oxidation, 489
Heating, carbonyl iron, under isothermal conditions, 376; Equiverse system, 93; for hot-forming, use of multi-jet torch, 475; industrial, use of gaseous fuels, 352; space, in rolling mill, 476; steel ingots, 309 (*Paper*)
Heating Furnaces, 93, gas-burner design, 81; heat transfer, 473; radiant-heat, for die blocks, 93; rotary-hearth, for slabs, 93; in strip mills, 93
Heating and Ventilating Equipment, corrosion, 493
Helium, uses, 469
Hematite, concentrates, pelletizing, 81; magnetite-hematite ore, 351; specular, low-grade, concentration at Humboldt Mine, 81
Heppenstall Co., development of die blocks, 474
Herserange Steel Works, 120,000-kW power station, 214
Heurtane Gas Producer, 353
"Hi-Nitrogen" Atmosphere Generator, 226
High-Speed Steel, cast, structure and properties, 88; discovery by Taylor and White, 496; hardening, 94; hardening temperature, 228; low-alloy, behaviour during heat-treatment, 93; micro-radiographic investigations, 104; transformations during tempering, 375; tools, nitriding, 227; water annealing, 227; *see also* Tool Steel
High-Temperature Alloys, GMR-235, 496; oxidation, 489; oxide structures on, 488; powder metallurgy, 99; precision casting, use of glass cast moulds, 91; vacuum-melted, hydrogen deoxidation, 359
High-Temperature Properties, effect of environment, 488; metals, 102
Historical, 246, 382, 496; Ayrshire Dockyard, activities, 246; Blumhof, Johann, 382; chains, hand-wrought, 496; Charpy, Georges, 239; correspondence of XIXth C. ironfounder, 382; development of ferrous metallurgy in last hundred years, 382; development of metallurgy and siderurgy, 246; early British iron industry, 382; early iron production, in Kropa (Yugoslavia), 382; early ironmaking in Sheffield, 382; early manufacture of Bessemer steel in Sweden, 382; 'Fauderias' splitting mills, 382; high-speed tool steels, 496; malleable iron, 382; manganese steel, 496; metallurgical treatises of 16th C–18th C, 246; Mirandaola forge, 382; Parthenon, structural iron of, 408 (*Correspondence*); Saint-Michel blast furnace, 496; Scottish pig-iron trade (1844–48), 496; soaking-pit development, 93; steelmaking since Bessemer, 113 (*Paper*); Wilkinson, Isaac, 382; wrought iron, 382
Hobbing, current practice, 474
Hoesch Walzwerke A.G., continuous strip mill, 363
Homogeneity, alloys, study, 243
Honeycomb Sandwich Structures, 246
Honing, liquid, for surface conditioning, 479
Hot Rolling. *See* Rolling
Hot Testing, in steel castings, 224
Hot Tears, in castings, review, 359; influence of core-making materials, 358; metallurgical examination, 358
Hot Topping, electric, effect on interior of heavy ingots, 88; electric, of forging ingots, 88
Hot Tops. *See also* Ingots
Hot Working. *See* Working
Hufford Carousel Forming Machine, 94
Humboldt Mine, concentration of low-grade ores, 81
Humidity, influence on radiation pyrometer, 215
Hydraulic Engineering, 216
Hydrazine, determination of vanadium v by, 245
Hydro-blast Unit, cleaning and de-coring, 472
Hydrochloric Acid, behaviour of Al–Cu alloys in, 378; dissolution of iron and aluminium, 109
Hydrodynamics, cavitation in (symposium), 493
Hydroforming, 94
Hydrogen, in acid O.H. process, 356; cathodic, diffusion into iron, 371; cathodic, production of internal blisters and cracks by, 483; content, effects of various steelmaking stages, 238; control in electric arc furnace, 356; deoxidation of vacuum-melted alloys, 359; determination in cast iron, vacuum fusion, 244; determination in iron, vacuum-heating, 244; determination in metals, spectrographic method, 491; determination in steel, by vacuum heating, 238; diffusion coefficient, electrochemical determination, 102; effect on hot cracking of welds, 364; effect on steels, 371; evolution from steel melted in induction furnace, 219; influence on flake formation in low-alloy steels, 102; influence on tensile properties of wires, 484; influence on yield point in steel, 102; in liquid basic Bessemer steel, 218; occlusion and equilibrium pressure in steel during electrolytic charging, 102; overvoltage of iron, effect of alloying elements, 244; permeability, effect on enamelling, 237; reduction of iron oxides, 469; vacuum degassing of tonnage steel, 221
Hydrogen Blistering, 494
Hydrogen Embrittlement, influence on delayed failure in steel, 102; mechanism, 492; turbine shaft failure, 487
Hydrogen Peroxide, use in chemical polishing, 98; use in descaling, 98
Hydrogen Sulphide, corrosion of tanks, 243; corrosion mechanism, 243; removal from coke-oven gas, 215

'Ignifluid' Combustion Technique, 467
Ilmenite Concentrates, electric smelting, 217
Impact Bending, mechanism of fracture under, 239
Impact Extrusion Process, 475
Impact Grinding, ultrasonic, 364
Impact Properties, austenitic welding electrodes, 96; boron-treated steel, 456 (*Discussion*); effect of nitrogen and phosphorus contents, 371; longitudinal, of bars, transient strain fluctuations, 484; manganese–molybdenum steels, 456 (*Discussion*); research, in France, 238; vacuum-melted iron–chromium alloys, 359
Impact Resistance, phases, of, 483
Impact-Testing Machines, calibration, 101
Impact Tests, Bessemer rimming steel, effect of notch size and shape, 101; cast steel, 90; Charpy, comparison with Izod, 239; Charpy, comparison with slow bend tests on Mn steel, 101; chromium–manganese case-hardening steel, 238; ductile cast iron, 496; effect of rate of stressing on ductile-brittle transition temperature, 374–375; hot-rolled low-alloy O.H. steel, effect of notch size and shape, 101; use of d.c. unbalance circuit, 483; weldable steels, 239
Imperfections, report of seminar, 373
Impurities, removal methods, 383; report of seminar, 373; use of radioactive tracers for determination in iron and aluminium, 109
Incandescent Heat Co. Ltd., continuous strand-annealing and galvanizing plant, 365; Equiverse system, 93; 225, 360; heat-treatment plant for seamless tubes, 226
Inclusions, cast steels, 357; determination in ball-bearing steel, radioactive method, 491; determination in cast iron, 105; distribution, in ingots, 470; effect in chromium steel, 242; formation, 357; from linings, 356; nitrides, formation, 373; non-metallic, in ball-bearing steel, 356; origin in casting pit, 472; siliceous, in iron, 62 (*Discussion*); sulphides, double etching for, 490; thermodynamic investigation, 105; titanium-bearing, in iron, 62 (*Discussion*)
Inconel X, elastic constants at high temperature, 484
Indentation, straining of metals by, 22 (*Correspondence*)
Indentation Tests, relation with stress-strain curve, 488
India, chromite deposits, 351; finishing trends, 99; iron and steel industry, 382; steelmaking expansion at Tata Iron and Steel Co., Ltd., 86
Indian Iron and Steel Co., moulding procedures, 91
Indicators, photothyratron, in rolling mills, 230
Indium, heat of fusion, 372
Indonesia, mineral deposits, 351; mineral resources, 351
Induction Furnaces. *See* Electric Furnaces
Induction Hardening, depth of chill determination, 227; determination of depth and quality of hardened layer, 485; effect on fatigue strength, 483; effect of initial heat treatment, 361; equipment and application, 226; grey cast iron, 226; surface, 226
Induction Heating, applications and equipment, 93; coils for, 227; in forging plant, 474; low-frequency, in foundries, 92; mains-frequency, 225; shells, for forging, 362; solid-state purification of Mo, 359–360; surface hardening of spheroidal graphite cast iron, 473
Indugas Preheating Chamber, 93
Industrial Uses and Applications, 246
Ingot Moulds, craze-cracking, 386 (*Paper*); failures, theoretical analysis, 88; shape of, 220; solidification of steel in, 356
Ingots, basic Bessemer rimming steel, 221; bottom pouring, 221; "C. & D." hot tops, 221; carbon steel, segregation, 470; casting practice in France, 220; cooling, 443 (*Discussion*); cropping for wheel rims, 357; defects, 474; defects due to cracks, effect of crystallization conditions, 357; effect of electric hot topping, 88; forging, electric hot-topping, 88; "Foseco Feedex" hot tops, 221; heavy forge, soundness, 86; hot-topping with electric arc, 221; inclusions distribution, 470; increased heating rates, 309 (*Paper*); inverted-V segregated zone, 88; practice in Japan, 356; production for jet engines by arc-melting process, 87; rimming steel, experimental, 221; shape of, 220; solidification process, 470; structure, 449 (*Discussion*); structure during solidification and influence of temperature, 221
Inland Steel Co., sealing bosh of blast furnace, 84
Inspection, electronic, of continuous strip, 476; methods at Ryan Aeronautical Co., 242; welds, use of temperature-indicating material, 96
Institute of Foundry Technology (Düsseldorf), history and activities, 88
Institution of Mechanical Engineers, industrial furnaces, symposium, 360

Instrumentation, crystal mechanics, 373; in effluent disposal, 99; of experimental rolling mill (B.I.S.R.A.), 229; open-hearth furnace, 82, 219; process control, 232
Instruments, for cranes, 231; for mechanical tests, 100; for mould density, 472; for rolling mills, 231; in steel furnaces, 360; temperature-measuring. *See* Temperature Measurement and Control; thickness measurement, electronic, for thin sheet or wire, 231
Insulating Bricks, characteristics and performance, 83
Insulating Firebricks, properties and uses, 83
Insulation, thermal. *See* Thermal Insulation
Intercommunication, in iron and steel industry, 231
Internal Cohesion, deep-drawing steel, 489
Internal Friction. *See* Friction
International Flame Research Committee, performance trials at Ijmuiden, 214
International Harvester Co., high-temperature materials handling, 361, 473
International Institute of Welding, report of commission on behaviour of metals subjected to welding, 477
Interstitial Atoms, behaviour, 373
Investment Casting, alloys, 222; jobbing foundry in South Africa, 91; principles and advantages for intricate parts, 358; use of expendable pattern materials, 225; use of frozen-mercury patterns, 224
Investment Castings, turbine rotors and blades, 381
Iodine, neutron-capture gamma-ray spectra, 104
Ion Exchange, purification of plating solutions, 479; separation of Al and Ca from iron, 245; treatment of plating shop wastes, 365; *see also* Analysis
Iron, acid corrosion, inhibitors for, 494; alpha, condition of boron in, 243; alpha, crystals, corrosion in diluted acids, 108; alpha, elastic after-effect, 482; alpha, fracture, 374; alpha, influence of grain boundaries on behaviour of C and N, 102; alpha, precipitation of carbide particles, 105; alpha, strain ageing, 64 (*Discussion*); alpha, supersaturated carbide separations from, 373; anelasticity and solid solubility, nitrogen in, 102; anode passivation in sulphates, 380; Armco, alternating bending strength at various grain sizes, 240; Armco, diffusion of copper into, 371; attack by iron-saturated zinc melts, 480; bearings, sintered, 481; bibliography, 469; buried, temperature coefficient and heat of activation of corrosion reaction, 107; carbonyl, heating under isothermal conditions, 376; carbonyl powder, preparation, properties and application, 237; catalysts, carbon deposition reaction over, 1 (*Paper*); chromium-alloyed influence of heating velocity, 492; cold-worked, X-ray line broadening, 101; containing sulphur and phosphorus, attack by iron-saturated molten zinc, 235; corrosion in nitric acid, 379; corrosion in soils, 378; corrosion and protection in chlorides, 380; crystals, effects of structure on mechanism of oxidation, 490; cupola-melted, defects, 92; dephosphorization with lime, 220; dephosphorization with slag, 470; desulphurization in electric furnace, 217; determination of hydrogen, vacuum-heating, 244; determination of impurities by radioactive tracers, 109; determination of phosphorus, using radioactive isotopes, 244; determination in refractory minerals, polarographic method, 109; determination in slags, polarographic, 246; diffusion of cathodic hydrogen into, 371; discharge of ions in cathodic polarization,
Iron—*continued*
365; dissolution in hydrochloric acid, 109; dissolution in nitric acid, 109; dissolution rate, effect of thiourea compounds, 494; "Ductiliron", manufacture, 223; effects of addition elements on polymorphism, 372; electronic energy bands, 370; equilibrium potential-pH diagrams, 380; etchant for cementite and phosphorus, 373; fracture, effect of added elements, 484; galvanized, zinc removal, 365; graphite spheroidization, 223; graphitic, stresses in, 223; gyromagnetic ratio, 370; hardness changes during heating, 240–241; high-purity, crystals, tensile properties, 105; interfacial tension with slag, effect of carbon, 469; liquid, carbon solution in, 372; liquid, oxygen activity in, 219; liquid, reaction of carbon and oxygen in, 473; magnesium nitride treatment, 223; magnetic properties, 220; magneto-elasticity, 238; malleable-base spheroidal, 471; meteorites, lack of uranium content, 112; molten, desulphurization with slag, limiting stages, 220; molten, improving properties of, 223; neutron-capture gamma-ray spectra, 104; nitrogen solubility in, 52 (*Discussion*); oxidation mechanism, 492; passive behaviour, 378; powder, compressibility, 366; powder, corrosion determination, 492; powder, effect of copper additions, 481; powder, manufacture, 237; powder, self-diffusion and flow, 367; powder, sintering, 481; powder compacts, addition of copper, 237; powder magnets, technical properties, 100; powder-metallurgy applications, 481; powder parts, heat-treatment, 481; production, development trends, 86; pure, magnetic ageing, 370; pure, magnetic properties, 486; pure, preparation, 469; pure, strain ageing, 64 (*Discussion*); purification and determination of transition temperatures, 489; reaction with Al melts, 480; reaction with copper oxide, 107; reaction with liquid aluminium, 366; reaction with oxygen at low pressures, 107; scattering of μ-mesons 246; self-diffusion, in Fe–C alloy, 243; separation of Al and Ca by ion exchange, 245; separation and direct determination, 245; soft, heat content and heat of transformation, 372; solid, oxygen diffusion, 102; spectra, strength of oscillations, 491; sponge, present-day production methods, 86; sponge production, 86; structural, of Parthenon, 408 (*Correspondence*); tubes, magnetic screening, 496
Iron Alloys, determination of carbon, spectrographic method, 491; double etching for sulphide inclusions, 490; solubilities of carbon and nitrogen, 242; thermodynamics of carbon dissolved in, 52 (*Discussion*); vacuum and pressure melting, 359
Iron Aluminides, hardness, temperature dependence, 107
Iron–Aluminium Alloys, ductile, vacuum-melting production, 102
Iron–Aluminium–Chromium Alloys, oxidation resistance, 379
Iron–Beryllium–Phosphorus System, iron sector, 107
Iron–Cadmium Alloys, preparation by amalgamation, 107
Iron Carbide, conversion to molybdenum carbide on tempering, 377; Hägg, modifications, 109; preparation attempts, 4 (*Paper*); separation from chromium carbide, 482
Iron–Carbon Alloys, decarburization reaction, study, 355; microscopic and hardness examinations, 373; nickel-containing, phase diagram, 106
Iron–Carbon–Dioxide–H_2O System, equilibrium potential-pH diagram, 380
Iron Castings, cracking, effect of extraneous elements, 472; enamelling, 98; manufacture of thick, 91; microstructure requirements in chemical industry, 378; structure, properties and applications, 471
Iron–Chromium Alloys, alpha-sigma transformation, 376; anodic behaviour in H_2SO_4, 380; brittleness at 475° C, 369; dilatometric study of $\alpha \rightleftharpoons \sigma$ transformation, 106; dissolution in nitric acid, 109; effect of aluminium on sigma formation, 106; effect of precipitation on magnetic properties, 241; equiatomic composition, 221; influence of phosphorus on oxygen solubility, 219; order-disorder transformation, 376; passivation, 380; passivity, 380; self-diffusion of iron, 243; sigma-phase transformation, 376; vacuum-melted, impact properties, 359
Iron–Chromium–Cobalt Alloys, effects of cold work, 241; influence of nickel additions, 488; properties, influence of nickel, 242
Iron–Chromium–Cobalt–Nickel Alloys, high-temperature strength properties, 104
Iron–Chromium–Cobalt–Vanadium Alloys, effects of cold work, 241
Iron–Chromium–Nickel Alloys, effects of cold work, 241; oxidation, 489
Iron–Chromium–Nickel Melts, oxygen solubility, 492
Iron–Chromium–Nitrogen–Carbon Alloys, austenitic, stainless, manufacture and properties, 106
Iron–Chromium System, anomaly of α-solid solution, at high temperature, 107; diffusion transformations, 375
Iron–Cobalt Alloys, effect of ternary additions of Si and Al on ordering reaction, 106; order-disorder transformation, 106; ordering and magnetic heat-treatment, 106; research on properties, 367
Iron–Cobalt–Vanadium Alloys, effects of cold work, 241
Iron–Cobalt–Vanadium System, equilibria between α-γ mixed crystals, 377; formation with retarded α-γ transformation, 377
"**Iron-Coke**" production, 82
Iron–Gold Alloys, thermodynamic properties, 377
Iron Industry, early British, 382
Iron Iron–Oxide Lime System, 220
Iron / Iron–Phosphide / Tungsten–Phosphide System, 377
Iron Lime Oxygen Phosphorus, equilibrium diagram, 220
Iron–Manganese Alloys, 357
Iron–Manganese Oxides, reaction with liquid iron in alumina crucible, 220
Iron–Molybdenum Alloys, equilibrium diagram and solid-state reactions, 491
Iron–Nickel, magnetic domains, 487
Iron–Nickel Alloys, 357; controlled-expansion, 357; equilibrium diagram and solid-state reactions, 491; heat of transformation, 372; influence of phosphorus on oxygen solubility, 219; irreversible, lattice transformation, 490; liquid, activity of sulphur, 87; magnetic anisotropy induced by magnetic annealing, 103; martensite transformation, 375; powders, sintering, 99
Iron Nitrides, behaviour, and effect on austenitic grain size in steel, 105
Iron–Nitrogen System, determination of alpha-phase boundaries, 302 (*Paper*); researches, 106
Iron Ore, agglomeration, crushing, grinding and separation methods in U.S., 351; beneficiation, 81; Canadian, 80; Cleveland ironstone, sintering, 434 (*Paper*); dehydration, influence of carbon monoxide, 81; evaluation of properties, 351; flotation, 81; formation of reaction skarn, 351; French, non-conventional reducing processes, 86; Germany (Eastern), 466; handling

Iron Ore—*continued*
equipment, 80; handling and preparation, 81; ilmenite concentrates, 217; imports and production in Japan, 80; low-bulk density, blast-furnace operation, 85; Lorraine, constitution and composition, 80; Lorraine, sintering, 81; low-grade, Russian, 351; Luxembourg, sintering, 81; pelletizing, 81; pelletizing plant at Malmberget, Sweden, 81; reduction by natural gas, 81; reduction by non-conventional methods, 86; requirements of U.S., 80; sinter plant at Appleby-Frodingham, process control, 213; sintering, 81, 466; smelting with anthracite, 85; titaniferous ironsands, 217; Standard Specification proposals, 80; supplies in U.S., 80; treatment in U.S., 351; Yugoslav, presence of barytes, 351; *see also* under specific types of iron ore

Iron-Ore Deposits, Canada, 80; Lorraine Basin, 80; Macedonia, 351; New Zealand ironsands, 351; Sweden, formation of reaction skarn, 351; world, 80

Iron Oxides, in burning of magnesite, study, 354; carburization, with carbon monoxide, 109; catalytic effect on steam-carbon reaction, 353; equilibrium relationships in chrome refractories, 216; recovery from waste pickle liquor, Ruthner process, 97; reduction with hydrogen and CO, 469; *see also* Feroso–Ferric Oxide; Ferric Oxide; Ferrous Oxide; Iron/Iron–Oxide/Lime System

Iron–Palladium Alloys, equilibrium diagram, 105

Iron Phosphide, Iron/Iron–Phosphide/Tungsten–Phosphide System

Iron–Phosphorus Alloy, heat content, 372

Iron–Phosphorus–Tin System, equilibrium diagram, 107

Iron–Phosphorus–Vanadium System, equilibrum diagram, 107

Iron–Platinum Alloys, equilibrium diagram, critical examination, 105

Iron–Silicon Alloy, nitrogen diffusion and solubility, 106

Iron–Silicon Crystals, polygonized, dislocation sites, 107

Iron–Silicon–Silver System, 492

Iron and Steel, 468; analysis, bearing of Achema XI, 494; casting industry in Japan, 222; gallery at Science Museum, 121; macro-etching, 105; new techniques (*Book*), 247; recent advances, 468; studies on, in Japan, 482

Iron and Steel Engineers Group, report of 29th meeting, 69

Iron and Steel Industry, activities in 1955, 468; Australia, 382, 468; Australia, developments, 496; communications systems, 231; developments in 1956, 468; engineering developments, 216; Europe (1955), 383; France, 382; Germany, survey, 112; India, 382; international research, 216; Italy, 468; Japan, 383; Luxembourg, 111; maintenance painting, 99; Minas Gerais (Brazil), 382; North East Coast, 382; process control problems, 232; refractories for, 83; Russia, 111, 216; Russia (*Book*), 208; Russia, projected (Siberia), 468; Russia (south-west), 382; science and technical enterprise, 112; Scotland, 382; selection of refractories, 83; Tees-side, 111; uses and application of research, 383

Iron and Steel Institute, Autumn General Meeting (1955), report of discussions, 47; Annual General Meeting (1956), report of discussions, 438; Bessemer Centenary Exhibition at, 118; nomination of A. H. Ingen Housz as President-Elect, 462; presentation to Verein deutscher Eisenhuttenleutte, *facing* 462, 463; special reports, notices, 208

Iron and Steel Making, in Colombia, South America, 111; in France, 246; Spain, 217; statistical techniques, 112;
Iron and Steel Making—*continued*
Ukraine, 217; use of oxygen (*Book*), 496; *see also* Ironmaking; Steelmaking

Iron and Steel Today (*Book*), 247

Iron and Steel Works, aerodynamic flow problems, 82; chemical testing, 380; engineering department, 231; gas-turbine operation and applications, 82; Jones and Laughlin's Aliquippa Works, 354; Lorraine Basin, common power station, 82; management, 383; Mo i Rana, 468; operation and maintenance of equipment, 231; *see also* Steelworks

Iron–Tellurium System, magnetic properties and phase diagram, 106

Iron–Titanium System, 491

Iron–Zinc Alloy, electroplating as protective and decorative finish, 235

Ironmaking, early, in Sheffield, 382; electric process, 469

Ironsands, New Zealand, 351; titaniferous, electric smelting at Onekaka, 217

Ironstone, Cleveland, sintering, 434 (*Paper*); Frodingham, underground mining, 213

Irradiation, effects in crystalline solids, 374; use in investigation of wear resistance of cutting tools, 97

IRSID, activities of coke and iron division, 352; Bessemer converter trials, 218; Cowper stoves as heat accumulators, 216; flame radiation research, 82; production data of Bessemer converters, 218; properties of six cokes, 215; studies of Thomas process, 87

ISCOR, blast furnace (25 ft hearth dia.) 354

Italy, iron and steel industry, 486

Japan, analytical chemistry of iron and steel, 110; control systems, 367; development of forging process, 228; iron and steel, developments in study of, 482; iron and steel casting industry, 222; iron and steel industry, 383; Iron and Steel Institute of Japan, Presidential Address, 112; lubricating engineering, 232; pig-iron production, 216; powder metallurgy, 99; production of special steels, 356; raw materials, 80; rolling of bars and sections, 95; rolling of flat steel, 229; specifications, 367; steelmaking progress, 217; tube welding, 476

Jet Engines, alloy steel ingot production by arc-melting process, 87; components, flame spraying of cermets, 236; heat-resistant alloys for, 356; nickel-cadmium plating of parts, 480; turbine blades, vacuum-melting process, 87

Jets, effect of density differences, 225; gas, high-temperature, in manufacturing processes, 360

Joint Bars, investigations, 372

Joint Metallurgical Societies Meeting in Europe (1955), technical sessions in: Dusseldorf, 81, 82, 84, 86, 94, 96, 97, 111, 217, 238, 379; Liège, 81, 84, 86, 104, 238; Paris, 82, 86, 94, 98, 104, 111, 238

Jominy Test, 489; reproducibility, 488

Jones & Laughlin Steel Corp., Aliquippa Works, 354; Aliquippa Works, 11-in. rod mill, 229; automatic controls on coke-oven gas fired boilers, 352; electrification of blooming mill at Aliquippa, 95

Junker, Otto, G.m.b.H., coreless induction mains-frequency furnace, 356

Kaiser Aluminium Co., aluminium coating test, 236

Kamysh-Burunsk Sinter Plant, 213

Kinetics, flow experiments in study of, 353

Killed Steel, aluminium-, for cold upsetting, tests, 474

Kinney Vacuum Pump, 359

Kirkendall Effect, applications to porosity and plating problems, 479

Kiruna Mine, extension and use of hot compressed air, 80

Kokura Steel Works, blast-furnace practice, 216

Krause Burners, 353

Kropa (Yugoslavia), early iron production, 382

Krupp-Renn Process, 86, 217

Kuwait Oil Co., corrosion problems, 379

Kuznetsk Metallurgical Combine, spectrographic analysis, 491

Kwinana Refinery, cathodic protection, 108

"L-D" Process. *See* Converters; Oxygen

Laboratory, corrosion research, Massachusetts Institute of Technology, 494; works, organization, 243

Laboratory Furnaces, "mock-up", 87

Lacquer, spraying, 236

Ladles, crane for, 476; practice, 90; practice for acid steel, 90; refractories, 468; use of "teapot" and stoppered, in acid electric foundry, 90

Lamination Materials, electrical, 220

Lamps, tungsten-strip, calibration, 215

Lattice Defects, in cold-worked metal, 374; review, 374; theory of formation during plastic strain, 367

Lattice Vacancies, behaviour, 373

Lattices, close-packed, stacking faults, 374; f.c.c., dislocations in, 374; sodium chloride, 374

Lead, determination in effluents, colorimetric method, 110; determination in steel, polarographic, 381; effect of trace amounts on annealing of blackheart malleable iron, 90; electroplating in ultrasonic field, 365; heat content, 372; heat of fusion, 372; scattering of μ-mesons, 246; *see also* Antimony–Lead–Tin Plating

Lead Coatings, 235

Lebanon Steel Foundry, basic electric practice for stainless-steel melting, 87

Lenin Steel Works, 468

Levelling, plate, 230

Levelume Nickel-Plating Process, 480

Leyland Motors, Ltd., cupola charging at Farington foundry, 473

Liège, low-shaft furnace project, 216

Light Alloys, metallurgy of, 246; nitric acid corrosion inhibitors, 494; stress/corrosion cracking, 377

Lighting, foundry, 471

Lignite, low-temperature carbonization, 215

Lime, dephosphorization of iron with, 220; determination in dolomite and limestones, use of trilone B, 495; pulverized, for desulphurization of molten pig iron, 355; *see also* Alumina/Lime/Silica Diagram; Iron/Iron–Oxide/Lime System; Iron/Lime/Oxygen/Phosphorus

Lime/Silica System, transfer numbers of calcium ions, 217

Limestone, determination of Ca and Mg, use of trilone B, 495

Limonite, deposits (Atacocha (Peru)), 466

Lincolnshire Iron and Steel Institute, officers and council (1956–57), 210

Lindberg Engineering Co., furnace heating element, 360

Lingane-Karplus Method, extension to potentiometric determination of Mn to high-silicon ores and steels, 110

Linings, converter, monolithic, 217; for core-less low-frequency induction crucible melting furnaces, 83

Lithium, in brazing alloys, 232

Lithium-Base Multipurpose Lubricant, 96

Locomotives, steelworks, 232

London and Scandinavian Metallurgical Co., Ltd., "C. & D." hot tops, 221

Longwy-Burstlein Process, 82, 352

Lorraine, coals, characteristics, 352; coals, coke production by Carling process, 215; coke-oven and blast-furnace gas production and transmission, 82; coke ovens for iron-smelting industry, 214; coke tests on blast-furnace plant, 215; iron-ore beds, study, 80; ironstones, mineralogy, petrology and beneficiation, 80; metallurgical coke, 215; power generation, 214; steel-works common power station, 82
Los Angeles, cathodic protection of water tanks, 494
Low-Temperature Properties, 452 (*Discussion*); stainless steel, 485; strength and plasticity to — 253° C, 369
Low-Temperature Recovery, in cold-worked metals, 106
Low-Temperature Treatment, 473: Cr–Mn–W tool steel, 360
Lubatti Process, 469
Lubricants, 96; cutting, efficacy, 97; for drawing tubes and sections, 475; extrusion, glass, 229; grease, selection for steel plant, 96; grease, spreading rate, 233; lithium-base multipurpose grease, 96; oil-in-water emulsions, 364; plastic, 477; rolling mill, action, 95; selection for cold-working presses, 474
Lubrication, 96, 232, 364, 477, bearings, theory, 477; cam and tappet, 246; in cold extrusion, 229; cranes, 96; glass, in extrusion, 94; graphite-impregnated plastic, 477; hydrodynamic, in parallel sliding, theory, 96; metal powder bearings, 100; in powder metallurgy, 100; pressure, of cold rolling mills, 232; review of systems, 232; review of trends and developments, 232; roll-neck, 364; under varying pressure, 477; wetting effect and surface tension, 364
Lurgi Gasification Process, 215
Luxembourg, iron ore, sintering, 81; iron and steel industry, 111
Lynchburg Foundry Co., shell moulding, 91
Lysaght's, John, (Scunthorpe) Works, scope and organization of electrical department, 96

McDonnell Aircraft Corp., ultrasonic inspection, 370
Macedonia, iron ores, 351
Machinability, 97, 233, 364, 478; definition, 97; effect of heat-treatment, 478; heat treatment for, 233
Machine Tools, beds, use of plastic cement methods for moulds, 90; use of liquid CO_2 cooling, 233
Machinery, 95, 231, 363; iron and steel plant, 476
Machines, failure of parts in service, 487; fatigue of parts, 240; for mechanical tests, 100; parts, wear determination, 370: parts, wear determination using radioactive indicators, 241
Machining, 97, 233, 364, 478; advantages and limitations, 100; Agietron electro-erosion unit, 478; chromium–molybdenum–nickel alloys, 357; combined with die stamping, 474; electro-spark, 233, 478; electrospark, flour-milling rolls, 364; electro-spark, scientific aspects, 97; fundamental problems, 97; hard metals, electro-spark, 478; micro, use of virtual electrodes, 478; plasticity phenomena, 103; promotion of good tool life, 233; properties, Belgian research, 97; screw, advantages and limitations, 100
Magnaflux Test, effect of deoxidation and hot work, 241
Magnesia, determination in dolomite and limestone, use of trilone B, 495; *see also* Refractory Materials (Magnesia)
Magnesium, anodes, for underwater cathodic protection, 243; behaviour in spheroidal graphite cast iron, 491;
Magnesium—*continued*
comparison with steel, 111; determination in dolomites and limestones, use of trilone B, 495; metallurgy of, 246
Magnesium Nitride, treatment of iron with, 223
Magnetic Amplifier, control systems, 363; for rolling mill drives, 230
Magnetic Core Iron, heat treatment, 226
Magnetic Flaw Detection, fatigued rails, trials, 240
Magnetic Materials, alloy strip, 489; chromium steel, heat-treatment, 360; high-frequency metallographic investigation, 372; iron–cobalt alloy, 106; iron–nickel films, magnetic domains, 487: iron powder, technical properties, 100; by powder metallurgy, 99; preparation of single thin layers and laminated structures, 103: relation between coercivity and sheet thickness, 487; *see also* Magnetic Properties
Magnetic Particle Inspection, standards, 486
Magnetic Particle Test, in shipbuilding, 488
Magnetic Properties, alloy strip, 489; application to study of phase changes, 486; Barkhausen effect, 241; chromium steel, effect of annealing, 107; communications applications, 487; determination of austenite content, 486; domain structure in twinned crystals of Si–iron, 241; electronic apparatus for measurement of susceptibilities, 241; electronic energy bands in iron, applied to theory of ferromagnetism, 370; ferrites, 481; ferromagnetism and anti-ferromagnetism (conference), 487; gyromagnetic ratio of iron, 370; Hall effect in permalloys, 370; hysteresis loss in hot-rolled transformer sheet, effect of heat treatment, 241; initial permeability under strain, 370; iron, 220; iron–chromium alloys, effect of precipitation, 241; iron–tellurium system, 106; magnetic ageing of pure iron, 370; magnetic anisotropy induced by magnetic annealing, 103; paramagnetic properties of Cr-containing austenitic alloys, 370; pure iron, 486; relation with annealing temperature and hardness of Cr-magnet steel, 360; spontaneous magnetogalvanism and magnetization in irreversible ferronickels, 241: *see also* Magnetic Materials: Magnetization; Permanent Magnets
Magnetic Screening, iron tubes, 496
Magnetic Treatment, of water, 108
Magnetite, beneficiation, 81; deposits at Tuxedni Bay (Alaska), 466; determination in ores, 351; magnetite-hematite ore, 351; quartzite, concentration, 466
Magnetization, high-coercivity materials, thermal effects, 103; irreversible ferronickels, 241; *see also* Magnetic Properties
Magneto-Elasticity, polycrystalline iron and nickel, 238
Maintenance, steel plant equipment, 231
Malleable Cast Iron, application of mill casting, 92; blackheart, annealing, effect of trace amounts of tin, lead, and antimony, 90; carburization, 472; deoxidation, 222; effect of melting practice on properties, 471; embrittlement, toughening and subcritical thermal treatment, 90; heat treatment, 224; heat treatment, sulphating, and nitriding, 223; historical development, 382; melting with pulverized coal and oil, 471; melting, refractory selection and costs, 83; pearlitic, effect of molybdenum, 224; pearlitic, heat-treatment, 89; pearlitic, properties and applications, 222; production, review, 222; sampling for carbon determination, 494; structure, properties and applications, 471;
Malleable Cast Iron—*continued*
whiteheart, graphitization, influence of boron and aluminium, 89
Malmberget Plant, grinding tests, 478; pelletizing, 81
Management, production control, 383; scientific applications, 112
Manganese, determination in alloy cast iron, spectrochemical method, 495; determination in carbon steels, low-alloy steels and pig iron, spectrographic method, 495; determination in cast iron and steel, photometric method, 494; determination in high-alloy steels and alloys, spectrographic method, 491; determination in high-silicon ores and steels, potentiometric method, 110; determination in ores and minerals, photocolorimetric method, 495; effect on corrosion of iron, 244; effect on resistivity of nickel ferrites, 481; effect on shrinkage of grey cast iron, 222; influence on creep resistance, 104; influence on hot cracking of welds, 364; neutron-capture gamma-ray spectra, 104; production from steel-plant slags, 86; *see also* Iron–Manganese Alloys
Manganese–Molybdenum Steel, impact value, effect of P, 456 (*Discussion*)
Manganese Ore, California-Nevada, concentration tests, 81; handling equipment, 80; imports and production in Japan, 80; Philipsburg District, Granite County, Mont., 80; psilomelane, 80; pyrolusite, 80; Tombstone District, Cochise County, Ariz., 80
Manganese Steel, for castings, 224; discovery by Hadfield, 496; electrical resistivity, 286 (*Paper*); notch-sensitivity evaluation, 101: teeming, use of magnesite inserts for fireclay sockets, 88; thermal conductivity, 286 (*Paper*); welding, 477
Manganese–Titanium Iron, anti-friction properties, 223
Manipulators, on back side of blooming mill, 230; hydraulic, 231
'Mar Proof' Coating Material, 236
Marcasite, distinguishing from pyrites 380
Marforming, 94
Marine Engines, quality control and acceptance tests on castings, 371
Marion Malleable Iron Works, selection of refractories, 83
Marshalite, use for pickling baths, 365
Martempering, ball-bearing steels, 93; methods, 228
Martensite, cracking, 489; crystal growth, velocity, 105; decomposition, kinetics of first stage, 106; formation, effect of elastic strain, 376; formation, effect of external tension, 376; formation and toughness of low carbon steels, 375; growth, theory of explosion waves, 105; influence of carbon, 489; isothermal dilatometer study, 376; monocrystalline microhardness, 486; nucleation, 375; tempering, 489; transformation, 104, 360–361, 375; transformation, austenite stabilization, 376; transformation in ferro-nickel, 375; transformation, heterogeneous nucleation, 377; transformation, review, 376
Massachusetts Institute of Technology, corrosion research, 494
Massillon Steel Casting, Co., production methods, 224
Mastic, asphaltum coatings, 236
Material and Constructions Ltd., 10–12 t Demag-AEG electric furnace, 220
Material-Flow Diagrams, steelworks transport, 96
Materials Handling, high-temperature, 361, 473; ore and coal, 363; rail-less, 232
Matter, properties at high pressure, 489
Mechanical Handling, cupola charging, 473
Mechanical Properties, alloys, 482; bridge steel, 489; carbon-steel wire at low

Mechanical Properties—*continued*
temperatures, 452 (*Discussion*); chromium–manganese–molybdenum–nickel steels, 96; correlation with heat content, 237; effects of impurities and imperfections, 373; forgings, 474; formation, studies, 490; grey cast irons, 482; influence of dislocations in metal crystals, 483; metals, 484; sinter, test methods, 466; steels, axial dynamic load tests, 484; steels, effect of tempering temperature, 474; temper-rolled mild-steel sheet, 476; Timken 16–25–6, at high temperatures, 489; tool steels, determination, 372; use in hardness testing, 487; weld metals, modified type 347, 97
Mechanical Testing, machines and instruments for, 100; use of electrical extensometer, 100
Melbourne University, corrosion symposium, 377
Menasco Manufacturing Co., hardening of aircraft components, 226
Mercury Cathode Apparatus, for electrolytic analysis, 245
Mesons, μ, scattering in lead and iron, 246
Met-L-Chek Flaw-Finder, 242
Metal Cutting. *See* Cutting
Metal Deposition, 379
Metal Sections Ltd., cold formed structural sections, 230
Metal Structures, with spherical grains, statistical analysis, 373; use of models, 374
Metal Transfer, wear process, 103
Metallography, 104, 243, 372, 489; colour, ferrous alloys, 106; delta-ferrite, 57 (*Discussion*); electrolytic polishing, 490; high-frequency method for magnetic alloys, 372; magnification selection, 489; plastic laps for preparation of specimens, 105; preparation of samples, 105
Metallurgy, development in last hundred years, 382; of light alloys, 246; of stainless-alloys, application to welding problems, 97
Metals, b.c.c., interaction between dislocations and interstitial atoms, 482; at low temperatures, 452 (*Discussion*); properties, in relation to atomic structure, 372; purification by zone melting, 112; use at high temperatures, 102
Meteorites, iron, lack of uranium content, 112
Meteorology, relation to corrosion of steel, 493
Methods Analysis, productivity problems, 496
Microscope, examination of moulding sands, 489; hot-stage, bainite transformation studies, 373; horizontal, metallographic, for control of forgings, 372–373; interference, use for thickness measurement of chromium plating, 107; X-ray, 101; *see also* Electron
Microscopy, examination of metal failure, 100; moulding sands, study, 224; phase-contrast, theory and use, 489; X-ray, principles and development, 104; *see also* Electron
Microstructure, creep study, 485; effect on morphology of fracture, 239; effect on notch toughness of carbon steel, 239; influence on flake formation in low-alloy steels, 102; role in corrosion in chemical industry, 378; spherical grains, statistical analysis, 373
Mild Steel, acid pickling, 365; anodes, non-uniform dissolution, 243; bibliography, 469; brittle fracture, 364; brittle-fracture tendency, 369; brittleness test, 484; contact corrosion with aluminium alloy, 244; continuous strand-annealing and galvanizing plant, 365; delayed yielding, effect of temperature, 101; dissolution rate, effect of thiourea compounds, 494; fracture during notch-bend tests, 369; powder, sintering, 366; strip,
Mild Steel—*continued*
pre-treated, 98; temper-rolled, effect of bending, 476; temper-rolled sheet, anisotropy of strain ageing, 476; welding, arc, in CO_2, 477; welding, straight-polarity inert-gas process, 477; wires, influence of steelmaking method on drawability, 237; yield rate, 237
Minas Gerais (Brazil), iron and steel developments, 382; site for seamless tube mill, 383
Mineral Dressing, ultrasonic, 351
Mineral Industry, special foundry irons, 223
Mineral Oil, cooling ability, 361
Mineral Resources, 80, 213, 351, 466; Indonesia, 351
Minerals, determination of Mn, photocolorimetric method, 495; determination of S, iodometric method, 495
Mining, St. John Del Rey Mining Co., Ltd., activities, 80
Mirandaola Forge, 382
Missouri Valley Regional Foundry Conference (1955), 357
Mixer-Grinder, application of granulometric index, 82
Mixers, machines for slag removal, 469
Mo i Rana Steelworks (Norway), 468; all welded steel structure for rolling mill, 96; rolling-mill units, 229
Models, application to furnace design, 225; blast-furnace gas-stream distribution, 84; composite, use of cold-setting resin, 364; metal structures, 374
Modulus of Elasticity, etc. *See* Elasticity, etc., Modulus of
Moffat County (Colorado), geology and mineral fuels, 351
Molybdenum, additions to chilled cast iron rolls, 230; in carburizing steels, 221; coatings, 480; in corrosion-resistant alloys, 357; determination in alloy cast iron, spectrochemical method, 495; determination in carbon steels, low-alloy steels and pig iron, spectrographic method, 495; determination in cast iron and steel, photometric method, 494; determination in high-alloy steels and alloys, spectrographic method, 491; determination with Spekker absorptiometer, 245; determination in stainless and Cr–Mn steels, colorimetric method, 109; determination in stainless steel, polarographic method, 110; determination in steel, concentration method, 110; determination in steels, ion-exchange, 381; determination in steels, photometric, 245; determination in steels, polarographic, 381; determination in W-bearing steels, colorimetric, 381; dissolution in nitric acid, 109; effect in chromium steel, 242; effect on pearlitic malleable iron, 224; hardness changes during heating, 240–241; solid-state purification by induction heating, 359; spraying, 236; vacuum melting furnaces for, 359
Molybdenum Alloys, oxidation-resistant scales, 489
Molybdenum Carbide, conversion from iron carbide on tempering, 377; precipitated in 4th stage of tempering, 258 (*Paper*)
Molybdenum–Phosphorus Steel, superheater tubes, 381
Molybdenum–Silver Alloys, manufacture by infiltration, 481
Molybdenum Steel, alloy carbides precipitated in 4th stage of tempering, 261 (*Paper*); carbide phase changes on tempering, 377; creep fracture, 485
Molybdenum–Tungsten Thermocouples, 467
Molybdenum–Vanadium Steel, effect of V-notch on tensile-creep behaviour, 485
Monazite, deposits in Rio Grande do Norte State (Brazil), 213
Mond Nickel Co., Ltd., carbonyl iron powder, 237
Monks, as ironmasters, 382
Morphology, precipitate, effects of nucleation site, 375
Motors, d.c., design, 231
Moulding, exhaust manifold, 358; at Indian Iron and Steel Co., 91; pressure, influence on pattern and flasks, 224; shell, 222; shell, advantages and limitations, 100; shell, comparison with other processes, 359; shell, development, 358; shell, development at Watertown Arsenal, 359; shell, equipment and techniques, 359; shell, history and development, 357; shell, at Lynchburg Foundry Co., 91; shell, practical problems, 359; shell, process and equipment, 91; shell, progress, 357; shell, techniques and machinery, 91; shell, thermal studies, 472; shell, use of inorganic binders, 472; snap flask, jackets and weights for, 91; winding drums, 472
Moulding Machines, types, 91
Moulding Materials, effect on rate of solidification of casting, 472; influence on hot tearing in steel castings, 224; testing, 90
Moulding Sands, 471; clay, fines, and water relationships for green strength, 224; clay-bonded, hot strength of, 358; drying, 359; drying plant, 222; load carrying power, 224; metallographic examination, 489; microscopical study, 224; non-consolidated, measurement of plasticity, 222; pH control, 90; physical properties at high temperatures, 224; production for shell moulding and CO_2 processes, 224; recovery, 479; scabbing tendency, 224; test patterns for evaluation, 224; testing, 90; for thin castings, 359; use of "wet clays", 90; zircon, 224; *see also* Sand-Slinger
Moulds, carbon dioxide process, 358; cast-iron, theory of cracking, 221; glass cast, for precision casting of high-temperature alloys, 91; green sand, for steel castings, practice, 90; gypsum cement for plastic patterns, 224; instrument for finding density of, 472; lacquer coating, 225; life, influence of composition, 472; for machine-tool beds, plastic cement methods, 90; packing, action of head of sand-slinger, 90; permanent, controlled flow of metal in, 91; permanent, use of, 91; pig-casting machine, coating materials, 84; plaster, rubber-lined core box for, 91; plaster, surface and internal bubble control, 91; sand, 471; sand, use and function of chills, 91; shell, production, mechanized equipment, 91; shell, technological properties, 359; taper, jackets and weights for, 91; testing of materials, 90; use of carbon dioxide, 359

NACA, combined-load testing machine, 484
National Physical Laboratory, creep and fracture at high temperatures, (symposium), 485; symposium on cavitation in hydrodynamics, 493
Natural Gas, burners for industrial furnaces, 215; furnace atmosphere, 360; heating up open-hearth furnaces, 82; reduction of iron ores, 81; suitability as fuel gas, 353
Neill, James and Co., permanent-magnet production, 382
Neon, influence on tensile properties of wires, 484
Netherlands, electroplating, 99; "Emma" coking plant, 214; iron and steel plants, 468
New Zealand, bentonites, 222; bentonites, sand bonding properties, 224; foundry practice, 357; ironsands, 351; metal finishing industry, 99

Newport and District Metallurgical Society, officers and committee (1956–57), 463
Ni-Hard White Cast Irons, applications, 223
Ni-Resist, structure, properties and applications, 471
Nickel, conservation, with high-manganese stainless steels, 104; determination in alloy cast iron, spectrochemical method, 495; determination in carbon steels, low-alloy steels and pig iron, spectrographic method, 495; determination in cast iron and steel, photometric method, 494; determination, complexiometric method, 110; determination in high-alloy steels and alloys, spectrographic method, 491; determination in plating baths, potentiometric method, 479; determination with Spekker absorptiometer, 245; determination, use of resorcylaldoxime, 244–245; dissolution in nitric acid, 109; effect of additions on iron–chromium–cobalt alloys, 488; effect on temper brittleness, 370; electrodeposition, change of cathode polarization, 365; electroplating in ultrasonic field, 365; hardness changes during heating, 240–241; heat content and specific heat, 372; influence on properties of iron–chromium–cobalt alloys, 242; magneto-elasticity, 238; polarization in H_2SO_4, 489–490; production, hydro-metallurgical process, 383; production slags, spectrographic analysis, 381; spectra, strength of oscillations, 491; *see also* Chromium–Nickel; Chromium–Nickel Steel; Copper–Nickel Steels; Iron–Nickel Alloys
Nickel Alloys, GMR–235, 496; surface treatment, 365
Nickel Aluminide, hardness, temperature dependence, 107
Nickel Chloride, electrolyte, 235
Nickel Dimethylglyoxime, co-precipitation of Co with, 245
Nickel Ferrites, effect of Mn and Co on resistivity, 481
Nickel Oxide, catalytic effect on steam-carbon reaction, 353
Nickel Plating, bath, energy inputs, 480; behaviour of nickel chloride and sulphate electrolytes, 235; by chemical deposition, 235; electroless plating, 480; jet engine parts, 480; Levelume high-speed process, 480; Nitec process, 98; solutions, determination of boric acid, 244; solutions, spectrographic analysis, 495; structure of deposit, 98
Nickel Steels, for castings, 224; physical properties, 104
Nickel Sulphate, electrolyte, 235
Nickelites, preparation, 481
Nimonic Alloys, 357
Niobium, determination in high-alloy steels and alloys, spectrographic method, 491; determination in stainless steel, polarographic method, 110; determination in steel, photometric, 381; effect in Cr–Co–Ni steel, 242; influence on stainless steel, 372
Nitec Process, 98
Nitric Acid, boiling, test for corrosion-resistant steel, 109; corrosion of iron in, 379; corrosion inhibitors for, 494; dissolution of metals in, mechanism, 109; dissolution mechanism of Al, Cu, Fe, Fe–Cr, Mn, and Ni, 109; dissolution rates of Fe and Fe–Cr alloys, 109; microstructure of iron castings for handling, 378; passivation of chromium steel in, 365; *see also* Platinum/Nitric-Acid; Steel/Nitric-Acid
Nitridation, effect on spectrographic analysis, 491
Nitrides, formation in steel, 373; properties, 377; transition metals, 372
Nitriding, in air, 227; Brown Boveri plants, 227; carbo-, theory and applications, 227; comparison of American and German methods, 228; controlled, 227; cutting tools, 227; evaluation of brittleness of nitrided layer, 486; grey cast irons, 223; high-speed steel tools, 227; iron alloys, influence on wear resistance, 361; malleable cast irons, 223; pressing tools, 227
Nitrogen, binding energy in dislocation, 243; content, effect on ageing of soft unalloyed steels, 369; content of steel in arc furnace, effect of slag type, 470; determination in iron and steel, colorimetric, 380; determination in steel, effect of Al, 380; diffusion and solubility in silicon iron, 106; effect on corrosion resistance of steel, 371; effect in Cr–Co–Ni steel, 242; effect on elongation in steel, 371; effect of hot cracking of welds, 364; effect on impact resistance of steel, 371; effect on orientation and transformation $\gamma \rightarrow \alpha$ in stainless-steel wire, 285 (*Appendix*); effect on solidity of steel castings, 357; influence of grain boundaries on behaviour in α-iron, 102; in iron anelasticity and solid solubility, 102; solubility in iron, 52 (*Discussion*); solubility in iron alloys, 242; in stainless steel, 356; use in heat treatment, 469; *see also* Iron–Nitrogen System
Noar's Method, plate calibration for spectrophotometry, 495
Nodular Cast Iron, annealing, 89; creep, 223; elastic and mechanical properties, 482; manufacture, properties and applications, 472; notch-ductile high-strength, 89; production experiments, 222; properties and effect of heat treatment, 224; properties, heat-treatment and applications, 469; risering, effect of silicon content on feeding distance, 358; risering requirements, 222; structure, properties and applications, 471
Non-Destructive Testing, castings, 101; shipbuilding, 488; water-wheel generating unit components, 101; welded structures, 371; welds, 371; *see also* under specific methods of non-destructive testing
Non-Ferrous Metals, casting machines, 84; high-temperature creep, 485; low-temperature properties, 369; sheet, deep-drawing and spinning, 94; vacuum distillation, 360
Non-Inflammable Fluids, 231
North East Coast, steel production, 382
Norway, automation in foundries, 92
Notch-Bend Tests, mild steel, 369
Notch Ductility, nodular cast irons, 89
Notch Sensitivity, manganese steel, 101
Notch-Tensile Test, 484
Notch Toughness, carbon steel, effect of microstructure, 239; hot-working tool steels, effect of heat-treatment, 101
Notch-Toughness Temperature Curves, calculation, in region of transition temperature, 101
Novo-Tagil' Works, automation in O.H. furnaces, 219; rolling of I-beams, 476
Nuclear Reactors, corrosion, 378; materials problems, 494; structural materials, 381
Nucleating Materials, in metallic melts 223
Nucleation, effects of site upon precipitate morphology, 375; heterogeneous of martensite transformation, 377; homogeneous *v.* heterogeneous in martensite transformation, 375; in martensite, 375; sigma-phase, in iron–chromium system, 375; technical possibilities, 223
Nuclei, concepts of, in metallic melts, 223
Nylon, coatings, 236; rolls, for forming strip, 95
Oil, fuel-, addition to coke mixtures, 214–215; in O.H. steelmaking, 48 (*Discussion*); producing equipment, corrosion control, 108; spreading rate, 233
Oil Firing, conversion of furnaces to, 353
Oil-in-Water Emulsions, lubricant properties, 364
Oil Wells, sweet, corrosion, 108
Onekaka, electric smelting of titaniferous ironsands, 217
Opacifiers, role in frit formation, 236
Opacimeter, Galey, use in converter, 219
Open-Hearth Furnaces, atomizing of fuel oil, 82; automatic regulating system, 470; automation at Novo-Tagil' works, 219; basic, controlled charging, 87; basic, diagram of metallurgical processes, 87; basic, ore-process, significance of slag appearance, 88; bunching prevention, 246; charging machines, hydraulic systems, 231; combustion, 360; construction and operation, 219; cost calculations, 356; design and practice in Russia, 218; design and standardization of dimensions, 355; Dinas-roofed, 470; feeding with low-carbon iron from scrap, 219; fettling of new hearth, 83; flames, 219; fuels, 87; gas burners, 215; gas-burners, design, 81; gas flow studies, 219; heat transfer, 360; heating up with natural gas, 82; "hot cooling", 218; instrumentation, 82; internal inspection by scanning periscope, 355; interworks school in Russia, 383; iron losses in slag, 219; methods of increasing output, 355; mixing of metal and slag, study, 356; oil burners, 360; operation with basic roofs, 469; protection of cooled parts by electrolytic polishing, 109; roof life, 410 (*Paper*); roof refractories, chemistry and durability of, 216; roof trials, 218; scrap charging time, decreasing, 87; Siemens-Martin, burners for 353; Siemens-Martin, construction and equipment, 219; Siemens-Martin, conversion to oil firing, 353; Siemens-Martin, heating-chamber profile, 355; Siemens-Martin, pig-iron/scrap performance problems, 219; Siemens-Martin, roofs, behaviour of silica brick, 354; spectrographic analysis of magnesite in, 495; sulphur distribution between flame and slag, 87; supporting girders, hot-spot formation, 219; Terni type, 219; tilting, stability of, 218; use of oxygen, 87
Open-Hearth Process, acid, hydrogen in, 356; basic, scrap-ore process, 356; economics, 217; oxygen requirements, 86; relative merits of low- and high-sulphur oil, 48 (*Discussion*)
Open-Hearth Steel, impact tests, 374–375; production in Transvaal, 410 (*Paper*); uses, 111; weldability, 96
Operational Research, techniques and applications, 496
Order-Disorder Transformation, iron–chromium alloys, 376; kinetics of, 376
Ore Bridges, application of d.c. adjustable voltage, 476; protective devices, 231; trolleys, analysis of wheel suspensions, 231
Ore Deposits, Atacocha District (Peru), 466
Ores, beneficiation by reduction-roasting-magnetic method, 81; Chiatursk carbonate manganese, production of ferro manganese, 221; chromite, California, concentration tests, 81; crushing by impact crushers and beater mills, 81; determination of Mn, photocolorimetric method, 495; evaluation, 80; handling, 363; high-silicon, determination of manganese, potentiometric method, 110; lateritic, 351; low-grade, mining and dressing in Europe, 213; mining and treatment, 80, 213, 351, 466
Orientation, preferred, in stainless-steel wire, X-ray study, 274 (*Paper*)

Ovens, drying, aerodynamic phenomena, 215; gas, for porcelain enamelling of stove parts, 99; low-temperature, fuel economy, 480
Oxidation, chromium–nickel heater alloys, effect of strain, 489; high-temperature alloys, 489; intergranular, in type 310 stainless steel, 489; of iron, in converter, 218; iron, mechanism, 492; iron-chromium nickel alloys, 489; mechanism, of iron crystals, effects of structure, 490; mechanism, from transition state theory viewpoint, 490; metals, 377; resistance of iron–aluminium–chromium and chromium–nickel alloys, 379; resistance of steel, use of Al coating, 98; simultaneous, with carburization, 226; steel surfaces, 233; structure revealed by, 490; at surface of case-hardening steels, 226
Oxidation-Resistant Scales, on molybdenum-base alloys, 489
Oxidation-Resistant Steel, types, compositions and properties, 357
Oxides, coatings, corrosion resistance, 366; films, constitution, 379; metal, reduction by carbon, 469; production of metal chlorides from, 351–352; structures on high-temperature alloys, 488; thermodynamic data, 83
Oxy-Acetylene Cutting, measures for improving, 233
Oxygen, activity in liquid iron, 219; blast enrichment in converter process, 86; blowing in cupola forehearth, 471; converter process, 218, 355; converter steelmaking plant and process, 355; determination in cast iron, vacuum-fusion method, 110; determination in coal, 245; determination in steel, aluminium-reduction, 185 (*Paper*); determination in steel, spectrographic method, 491; diffusion through solid iron, 102; effect on hot cracking of welds, 364; effect on reactions between CuO and Fe or Fe_3O_4, 107; effect on vitreous-coatings adherence, 98; measurement by Heat Prover, 495; pre-refining of high silicon iron in ladle, 220; reaction with carbon in liquid iron, 473; reaction with iron at low pressures, 107; solubility in Cr–Ni and Fe–Cr–Ni melts, 492; solubility in Fe–Cr and Fe–Ni, influence of phosphorus, 219; solubility in water, 383; use in converter, 469; use in converter and O.H. processes, 86; use in iron and steel making (*Book*), 496; use in open-hearth furnaces, 87; use of oxygen-air blast in iron furnaces, 84; use in steel production, 246; use in steelmaking in U.S., 86; uses in steelmaking, welding and cutting, and deseaming, 469; *see also* Carbon/Carbon-Dioxide/Oxygen/Steam System: Iron/Lime/Oxygen/Phosphorus
Oxygen Cutting, bars, plates and templates, 97
Oxygen-Steam, use in converter process, 86

Pacific Tube Co., tube drawing plant, 229
Packaging, American methods, 380; corrosion prevention, 494
Painting, maintenance, in iron and steel industry, 99; oxide undercoat, 366; rust protection, 99; ships, 108; steel structures, 99; use of wash-primer in surface preparation, 99
Paints, bitumen, 108; calcium plumbate, 481; corrosion protection and weathering aspects, 379; lead-base, for rust prevention, 109; marine, 237; protective function on metals, 99; for structural steelwork, 99; zinc-rich, 235
Palladium. *See* Iron–Palladium Alloys
Paper Industry, corrosion industry, 378
Parthenon, structural iron, 408 (*Correspondence*)
Particle Size Distribution, coke, assessment, 352; formula for comminuted products, 81
Pas-de-Calais, coke and gas production, 214
Passivation, anodes, of iron in sulphates, 380; application of polarization, 492; chromium steel, in H_2SO_4, 365; chromium steel, in nitric acid, copper-sulphate/sulphuric-acid and tap water, 365; in corrosion inhibition, 494; iron–chromium alloys, 380; mechanism, 379; stainless steels, 379
Passivity, iron–chromium alloys, 380
Pastes, for electric-arc furnaces, 217
Patternmaking, construction and setting, 224; development of Universal Pattern Co., (London), Ltd., 224; economics of materials and time, 225; epoxy resin, 224; expendable material for investment casting, 225; frozen-mercury, 224; for pressure moulding, 224; specifications and standards, 224; test, for sand evaluation, 224
Pearlite, metallography of, 489
Pearlite-Austenite Transformation, 376
Peat, semicoke from 352
Peddinghaus Flame Hardening Machines, 361
'Peerless J' Steel, 381
Pelletizing, hematite concentrates, 81; iron ore, 81; plant, at Malmberget, Sweden, 81
Penetrant Dye Test, 242
Penstocks, stress-relieving (low-temperature), 97
Periscope, furnace scanning, 47 (*Discussion*); scanning, for internal inspection of O.H. furnace, 355
Permalloys, Hall effect, 370
Permanent Magnets, domain concept, 241; effects of cold work on alloys, 241; production, 382; stabilization, 370; *see also* Magnetic Materials; Magnetic Properties
Permeability, gas, determination for fire-resistant materials, 354; hydrogen, effect on enamelling, 237; initial, under strain, 370
Perrin Process, 86
Petroleum Industry, cathodic protection at Kwinana Refinery, 108; corrosion, 108
Petroleum Plant, corrosion, 378; corrosion and cathodic protection, 379
pH, control of moulding sands, 90
Phase Transformations, in blast furnaces, 355
Phases, carbides, separation, electrolytic method, 491; interstitial, physical properties, 372; magnetic study, 486; metallic, bonding in, 243
Phosphate Coatings, 480; analysis of preparations used, 480; cleaning for, 234; retention during cold extrusion of artillery shells, 98
Phosphates, addition to boiler feedwater, 244
Phosphoric Acid, rust transformers, 234
Phosphorus, content, effect of slag on, 220; determination in cast iron and steel, photometric method, 494; determination in iron, using radioactive isotopes, 244; determination in steel, photometric method, 109; determination in steel, statistical analysis, 244; determination, using radioactive isotopes, 491; effect on corrosion of iron, 244; effect in Cu–Ni–Zn alloys on wettability and brazed strength, 233; effect on impact of Mn–Mo steels, 456 (*Discussion*); effect on impact resistance of steel, 371; effect on shrinkage of grey cast iron, 222; influence on oxygen solubility in Fe–Cr and Fe–Ni alloys, 219; iron-containing, attack by iron-saturated Zn, 235; radioactive, introducing into iron and slag, 495; segregations, etchant for, 373; *see also* Iron/Lime/Oxygen/Phosphorus
Photoelastic Analysis, methods, 484
Photometer, for X-ray intensity measurements, 488
Photothyratron Indicator, in rolling mills, 230
Physiology, effect of heat on human fatigue, 112
Pickling, 97, 233, 365, 478; acid, of mild steel, 365; baths, use of marshalite, 365; electrolytic, 234; liquor, disposal of and regeneration of sulphuric acid, 234; liquor, utilization of, 234; liquor, waste, regeneration, 97; nickel alloys in stainless steels, plant, 365; Nitec process, 98; non-acid, for stainless and heat-resisting steels, 97; residues, 234; strip, Abbey Works, 39 (*Paper*); sulphuric acid, closed-cycle, 479; sulphuric acid, energy relations 479; sulphuric acid, waste recovery, 479; waste liquor recovery of sulphuric acid and iron oxide, Ruthner process, 97
Piercing Mills, calculation for displaced piercing axis, 363
Pig Iron, analysis, electrolysis, 245; analysis, separation, 245; analysis, spectrographic method, 495; casting machine moulds, coating materials, 84; casting machines, 84; desulphurization with calcium carbide, 216; effect of gases, 89; foundry, effect of C, 92; molten, desulphurization with pulverized lime, 355; phosphoric, refining, 86; production, 84, 216, 354, 468; production in electric furnaces, 85; production in Japan, 216; production in low-shaft furnaces, 84; reduction of sulphur content, 85; Scottish trade (1844–48), 496; simultaneous production with cement by Basset process, 86; use of pyrite and pyrrhotite residues, 216
Pinholes, detection and detectors, 479; steel castings, 473
Pipelines, buried, corrosion, 493; coatings and cathodic protection, 108; corrosion, 378; pressure, automatic pressure butt-welding, 478; Trans-Arabian, welding, 364
Pipes, boiler, corrosion, 493; cast iron, failures, 223; cement coating and lining, 236; chromium-nickel steel, welding, 478; coal tar/enamel coatings, electrical tests, 236; cutting machine, autogenous, 478; high-pressure, use of chromium–molybdenum welding electrodes, 478; inert-gas tungsten-arc welding, engineering aspects, 97; mill, use of lithium-base multipurpose lubricant, 96; pressure, centrifugal casting, 358; pressure, shielded-arc welding on site, 478; production plant, 232; resistance-welded, weldability, 96; tensile tests on welded joints, 484; underground, cathodic protection, 244
Piston Rings, casting, materials and methods, 89
Pit Ropes, corrosion fatigue, 379
Planning, activities of Ferrous Metallurgy Ministry, 383
Plastic Behaviour, metals with bonded birefringent plastic, analysis, 482
Plastic Deformation. *See* Deformation
Plastic Forming, 229
Plasticity, hypo-elasticity theory, 103; in mechanical working and machining, 103; methods of evaluating, 483; non-consolidated moulding sand, measurement, 222; theory, 100
Plastics, coatings for corrosion prevention, 236; coatings, plastisols, 98; corrosion, 493; developments, 381; lubricants, 477; patterns, use of gypsum cement moulds, 224; synthetic resins, for thermal insulation, 83; vacuum metallizing, 236
Plastisols, coatings, 98
Plastograph, 222
Plate, bending, levelling and straightening machines, 230; blasting, 234; brittle fracture, 369; castings, effect of ribs and bosses, 92; castings, range of

Plate—*continued*
effectiveness of chills, 92; dynamo, properties, 496; fabrication works, 475; hot-rolled, oxidation, 233; manufacture for shipbuilding, 355; oxygen cutting, 97; tank, brittle fracture, 241
Platinum. *See* Iron–Platinum Alloys
Platinum/Nitric-Acid Electrolysis, 491
Poland, works visits, 468
Polarization, anodic, influence on etched surfaces, 489; cathode studies, 365; study and application to corrosion phenomena, 492; use of curves for corrosion study, 380
Polishing, chemical, 479; chemical, of austenitic Cr–Ni steels, influence of deformation, 234; chemical, with hydrogen peroxide, 98; drum, 365; electrolytic, 479; electrolytic, determination of valency of metallic ions in presence of ClO'_4 ions, 234; electrolytic, explosion danger with chromium –trioxide/acetic–anhydride mixture, 97; electrolytic, mechanism, 365, 380; electrolytic, for metallographic specimens, 490; electrolytic, stainless-steel tubes, 98; electrolytic, steel and special alloys, 98; electrolytic, of strip, determination of residual stresses, 483; electrolytic, use in corrosion protection of open-hearth furnaces, 109; electrolytic, use in understanding electrolysis, 380; electrolytic, using a.c., 479; metal parts, 98; overriders, 479
Polygonization, phenomena and applications, 373
Polythene, coatings, 236
Pore Size Distribution, refractory materials, 354
Porosity, application of Kirkendall effect, 479; in electrodeposits, 235; enamels, 237; in steel welds, review, 97
Port Kembla, new strip mill, 229
Portal Frames, cold formed, 230
'Porus-Krome' Hardening Process, 235
Potassium, determination in slags, polarographic, 246
Pouring System, in casting of steel, 357
Powder, steel, coarse, production and quality, 234
Powder Metallurgy, 99, 237, 366, 481; applications, 99; bearings, lubrication practices, 100; behaviour of spherical metal powders in pressing and sintering, 237; carbide flame-plating, 100; carbide formation by sintering, 367; controlled-expansion alloys, 357; copper additions to iron powder compacts, 237; density distribution in compacts, 481; diffusion in powder compacts, 375; elastic modulus of sintered materials, 240; electroplating of powder metal compacts, 235; finishing and plating of sintered parts, 481; friction and lubrication, 100; fritting of powders, 366; gas-turbine rotor blades and nozzle veins, 481; interactions of sintering reactions, 367; iron bearings, sintered, 481; iron–carbon compacts, heat-treatment atmospheres, 227; iron–copper compositions, sintered, 481; iron–nickel powders, sintering, 99; iron powder, compressibility, 366; iron powder, corrosion determination, 492; iron powder, sintering, 481; iron powders, treatments, and applications, 481; iron powder magnets, technical properties, 100; iron powder parts, heat treatment, 481; in Japan, 99; manufacture of electric contact alloys, 481; manufacture, properties and uses of metal powders, 237; manufacture of sheet, rod, tubes, and sections, 100; mixing powder with aid of tracer atoms, 100; nomenclature, 481; *v.* other precision forming methods, 100; pores in sintered bodies, 367; porosity, application of Kirkendall effect, 479; porous metal components, 367; prealloyed steel powders, 366; preparation, properties, and application of carbonyl iron powders, 237; production of powders, 366; self-diffusion and flow in compacted powders, 367; semi-formed drawing stock, 100; sintered steel powder compacts, 366; sintering, metal-atmosphere interaction, 481; sintering and sintered materials, for automobile industry, 481; sintering furnaces, 481; sintering process, 99; symposium, 99; symposium (*Book*), 208; thermal dilatation and contraction of polycrystalline sinter powder bodies, 237; vibratory compacting, 99
Power Stations, common for Lorraine Basin steelworks, 82; corrosion prevention in water-steam cycle, 378; steels for, 381
Power Supply, gas engines, with blast-furnace gas, 82
Poznan Fair, 468
Precipitation, electrical, 354; mechanism in supersaturated solid solutions, 104; rates, in metals, 374
Precision Casting, advantages and limitations, 100; alloy steels, 91; lost-wax method, 358; methods, 358; use of glass cast moulds for high-temperature alloys, 91
Precision Castings, processes and equipment, 359
Preferred Orientation, in stainless-steel wire, X-ray study, 274 (*Paper*)
Pre-refining, silicon iron, with oxygen in ladle, 220
Press, blanking, for discs, 474
Press Forging, vacuum, 359
Presses, choice of, 228; selection, 94; use of ductile cast iron for parts, 362; use of hydraulic and crank for cold working, 474
Pressing, 94, 228, 362, 474; automobile bodies, 362; sheet metal, use of resins for tooling, 474
Pressing Tools. *See* Tools
Pressings, plastic shaping, 228
Pressure Vessels, design, 489; simulated service testing, 487; stress determination, 483; tensile tests, 484
Process Control, in steel industry, 232
Process Industries, control equipment, 482
Producer Gas, suitability as fuel gas, 353
Production, development plant at Westinghouse Corp., 94; Pattern and Foundry Co., shell cores, 359
Production Control, in Russia, 237
Productivity, problems solved by equipment and methods analysis, 496
Profilograph, use in investigation of axia residual stress, 368
Projectiles, stresses during penetration, 484
Propane, application in metalworking, 96
Propane-Air, suitability as fuel gas, 353
Propellers, fabrication, 363
Protective Coatings. *See* Coatings
Pulp and Paper Industry, corrosion problems, 378
Pumps, vacuum, 359
Punches, properties and treatment, 475
Purification, metals, zone melting, 112
Pyramidone, determination of tungsten with, 245
Pyrites, cinders, as pig-making material, 81; deposits, Atacocha (Peru), 466; dissociation pressure, 496; distinguishing from marcasite, 380; as pig-making material, 216
Pyrometers, colour, 82–83; disappearing-filament, calibration, 215; immersion, 367; installation and maintenance, 83; milliscope, 354; optical, 82–83; optical, disadvantages, 467; photoelectric, 367; radiation, influence of humidity, 215; radiation, for transient temperatures, 82; recording optical, in Bessemer converter, 217; suction, description and use in glass furnaces and recuperators, 354; suction, theory and practice, 269 (*Paper*), 354; total radiation, 354; two-colour, use in converter process, 86; types, 83
Pyrometry, in creep-rupture testing, 487; maintenance, 354
Pyrrhotite, as pig-making material, 216

Quality Control, electrolytic metallographic polishing, 490; in grey iron foundry, 357; in industry, 370; marine engine castings, 371; in mass production, 247; metallic coatings, in France, 99; production, in Russia, 237; rapid methods of chemical analysis for, 110; statistical, for bath tubs, 236; statistical methods, 367
Quantometer, 383
Quartz, analysis, spectrographic method, 495; refractoriness-under-load, 354; sand, drying plant, 222; sand, plastic behaviour, 222
Quartzite, effect of surface area on transformation, 83; magnetite, concentration, 466; refractoriness-under-load, 354
Queensland Coals, physical and chemical properties and classification, 352
Quench Ageing, phenomenon of, 238; soft unalloyed steels, radioactive-isotope study, 369
Quenching, effect on thermal conductivities and electrical resistivities of steel, 6 (*Paper*), 10 (*Paper*); frontal, hardness testing after, 369; rate, effect on structure, 489; use of aqueous baths, 94
Quenching Media, mineral oil, 361

Radiation, disarrangement of crystals, 373, 374; flame, research, 467; safety precautions, 371; turbulent jet diffusion flames of liquid-fuel coke-oven-gas mixtures, 214
Radioactive Counter, for prospecting in Brazil, 112
Radioactive Indicators, use in determination of wear, 370; wear determination on machine parts, 241
Radioactive Isotopes, applications, 246, 492; carbon, use in study of diffusion in metals, 246; cutting-tool wear study, 233; determination of diffusion coefficients in ferrite, 243; homogeneity of alloys and mobility along grain boundaries, study, 243; metallurgical uses, 247; oxidation of iron, study, 492; phosphorus, introducing into iron and slag, 495; as radiographic source, 495; research applications, 491; trace analysis, 244; use in determination of phosphorus, 491; use for determination of wear of refractory lining of blast furnace, 84; use in investigation of wear resistance of cutting tools, 97; use in quench-ageing study, 369; use in research, 246; use in steel foundry, 488; *see also* Analysis, radioactive determination
Radioactive Radiation, use for thickness measurement, 371
Radioactive Sulphur, use in study of S compounds in coal during carbonization, 353
Radioactive Tracers, use for determination of impurities in iron and aluminium, 109; use in mixing of metallic powder, 100
Radioactivity, of samples, measuring device, 495
Radiographs, intensification, 488
Radiography, 242; auto. *See* Autoradiography; contact, use for study of distribution of Cr in steel, 372; gamma. *See* Gamma Radiography; high-voltage sources, 487; marine engine castings, 371; micro, diffusion in iron–chromium system, 375; micro-,

Radiography—*continued*
high-speed steel, 104; micro, metallographic study, 372; performance of 15-mV betatron, 242; selection of sources, 495; in shipbuilding, 488; standards for checking sensitivity, 101; stress measurement, directions of zero strain, 242; xeroradiography, 241; *see also* X-rays
Rail Steel, cold brittleness, 241
Rails, anchorage in steelworks, 95; fatigued, magnetic flaw detector trials, 240; joint bars, 372; manufacture and service performance in Germany, 111; manufacture from Thomas steel in France, 111; progress reports, 372; use of basic Bessemer steel, 111, 246
Railways, fastening of ore-yard siding on concrete, 95; signals circuits, 487; standard gauge traffic, 95; wagons, hidden-arc welding, 478; wheel tyres, production and faults, 242; wheels, craze-cracking, 388 (*Paper*); wheels for freight cars, 471
Rare Earths, additions in steelmaking, 87
Raw Materials, Germany, 111; Japan, 80; at Jones and Laughlin's Aliquippa Works, 354
Reactivity, freshly formed steel surfaces, 493
Recorder, automatic, for vibration processes, 369; furnace-atmosphere analysis, 495
Recording, automatic, of heat content curves, 237
Recrystallization, application of theory of dislocation, 106; after cold working, 489; recovery-nucleated process, 105; secondary, grain-boundary displacement, 490
Recuperation, heat, theoretical bases, 214
Recuperators, construction, dust problems, 214; design and types, 352; high-temperature, steels for, 82; metallic, use at Appleby-Frodingham, 82; radiation and convection, 473; Schack-type, at Arbed, 352; steel, for slab reheating furnaces, 82; use of suction pyrometer, 354
Reduction, ferrous oxide from CaO–SiO_2–Al_2O_3 slag, 469; iron oxides, with hydrogen and CO, 469; metal oxides, by carbon, 469; processes, development trends, 86; processes, non-conventional, for iron ores, 86
Refractoriness-Under-Load, creep, effect on checker performance, 84; quartz and quartzite, 354
Refractory Materials, 83, 215, 354, 467; behaviour under thermal stresses, 215; blast-furnace, properties and selection, 83; for bottom pouring of steel, 354; castable, monolithic concrete sections, design data, 83; casting-pit, 216, 468; clays. *See* Clays; corrosion control, 468; costs in malleable iron melting, 83; creep at high temperature, 468; determination of ferrous and ferric iron, polarographic method, 109; differential thermal analysis curves, 371; electric furnace roof, monolithic and shaped, 468; electron-microscope study, 489; emissivity, determination, 468; foundry applications, 83; gas-permeability determination, 354; insulating firebricks, properties and uses, 83; for iron and steel industry, 83; ladles, 468; malleable furnace, costs, 83; pore size distribution, 354; pouring-pit, corrosion by molten steels and slags, 83, 215; properties, 377; in solar furnace, 468; specifications, 468; strength, testing, 216; theoretical principles, review, 467; *see also* Linings
Refractory Materials (Alumina), sintered, stress-endurance, 354
Refractory Materials (Alumina Brick), manufacture and use in foundry, 83
Refractory Materials (Alumino-Silicate) physical characteristics, 83
Refractory Materials (Chrome), equilibrium relationships of iron oxides, 216
Refractory Materials (Chrome–Magnesite), properties, 216
Refractory Materials (Chrome–Magnesite Brick), use in open-hearth furnace, 469
Refractory Materials, (Dolomite), binderless, for basic electric arc furnaces, 220; determination of Ca and Mg, use of trilone B, 495; thermal decomposition of crystals, 354; uses and deposits in France, 467
Refractory Materials (Fireclay), abrasion tests, 468; gas-permeability determination, 354; sockets for magnesite inserts in teeming of high-manganese steels, 88; spectrochemical analysis, 245
Refractory Materials (Fireclay Bricks), manufacture and use in foundry, 83; rupture modulus, 83
Refractory Materials (Forsterite), production, 215
Refractory Materials (Magnesia), spectrographic analysis, 495
Refractory Materials (Magnesite), burning, study of iron oxides in, 354; gas-permeability determination, 354; industry, discussion, 354; inserts for fireclay sockets in teeming of high-Mn steels, 88; spectrographic analysis, 495
Refractory Materials (Silica), analysis, spectrographic method, 495; phases, 468; tridymitic, production, 83
Refractory Materials (Silica Brick), behaviour in Siemens-Martin furnace roofs, 354; chemistry and durability of, 216; gas-permeability determination, 354; test of failure under load at high temperature, 468
Refractory Materials (Zircon), properties 216
Refrigerators, gas-tight cast iron for, 89
Regenerators, for soaking pits (ARBED), 225
Regler's Double-Cone Camera, 104
Regulators, effect on associated equipment, 477
Reheating Furnaces, 225, 360, 473; batch-type, heat efficiency, 93; continuous, combustion, 360; continuous, heat transfer, 360; gas-burner design, 81; practice, 360; slab, Abbey Works, 33 (*Paper*); slab, pusher-type, steel recuperators for, 82
Relaxation, chromium–molybdenum steel, 485
Relaxation Tests, chromium steel springs, 246
Research, operational, techniques and applications, 496; operational, use of statistics, 112; operational, value of, to management, 112
Residual Stresses, axial, use of profilograph, 368; in cast cylinder blocks, 225; determination, deformation measurement, 368; determination in strip during electropolishing, 483; determination in tube butt joints, 368; effect on wear resistance, 488; equations for, 483; influence of size after surface hardening, 473; influence on wear resistance, 239; measurement in cold-drawn steel tube, 240; by plastic deformation, 483; review, 368; stability, during cyclic loading, 239; *see also* Stress Relief
Resin, for composite models, 364; epoxy patterns, 224; phenol-formaldehyde, for tooling, 474; synthetic, for thermal insulation, 83
Resistance Furnaces. *See* Electric Furnaces
Resistivity, nickel ferrites, effect of Mn and Co, 481
Resorcylaldoxime, use as organic reagent, 244–245
Reverberatory Furnaces, conversion to oil and pulverized coal firing, 471; experiments, 86; heat transfer, 223
Rhodium, electrodeposition, 480
Rigidity Modulus, iron–chromium–cobalt alloys, effect of nickel, 488
Rimming Steel, Bessemer, effect of notch shape and size on impact testing, 101; effect of vanadium on strain ageing, 369; experimental production of 450-kg ingots, 221; ingots, basic Bessemer, 221; weldability, 477
Rinsing, prevention of pinpoint corrosion, 97
Rio de Janeiro, tungsten plant, 383
Riveting, research difficulties, 478
Robertson, W. H. A. and Co., Ltd., slitting machine, 230
Robinson, Arthur and Sons Ltd., drop forging practice, 362
Rocket Engines, components, flame spraying of cermets, 236
Rockwell Hardness Testing, precision measurement of indentors, 487; sheet, 487
Rod, annealing furnace, 227; manufacture from metal powders, 100; rolling practice in Russia, 476
Roll-Forming, 230; cold, 231; cold, sheet metal parts, 363
Rolled Products, descaling (mechanical), 98; utilization, 362
Rolling, bars and sections, in Japan, 95; cold, graphical solution, 363; cold, study of, 230; cold, of teeth and splines Roto-Flow process, 230; cold, transformer steels, 229, 230; cold, yield-stress/compressive-strain curves, 484; contour in precision forge-roll process, 363; contour for propellers, 363; deformation, stereoscopic examination, 95; design of finishing round passes, 229; flat steel, in Japan, 229; gears, 476; hot, calculation of cooling of metal, 95; hot, influence of different factors on roll pressure, energy consumption, spread and forward slip, 229; hot and cold, equipment at Westinghouse Electric Corp., 94; I-beams, 476; inter-works school in Russia, 383; metallurgical factors, 228; power requirement, calculation, 363; pressures, determination, 475; repeated shapes, 230; rod, in Russia, 476; sections, 475; sheet, for automobiles, 230; spheroidal graphite cast iron, 89; stainless steels, 476; steel sheet, thickness control, 95; strip, tension measurement, 476; Tafel method of calculating extension, 229; thin strip, 230; transformer core steel, 230; transformer steel strip, 476; tube, in Japan, 476; tubes, on continuous mill, 476; utilization of rolled products, 362
Rolling Mills, All-Union Conference of rolling-mill operators, proceedings, 94; all-welded, steel structure, 96; American, 229; application of flame cutting, 233; application of servo-mechanisms, 230; bar, cooling-bed arrangement, 231; bearings. *See* Bearings; blooming, deformation, stereoscopic examination, 95; blooming, drives, twin, rectifier-controlled reversing, 95; blooming, electrification at Jones & Laughlin's Aliquippa Works, 95; blooming, Fontana, 475; blooming, manipulators on back side, 230; blooming, type 1150, layout and component parts, 475; blooming, type 1150, rolling conditions, 475; cold, drive for 5-stand, 476; cold, pressure lubrication, 232; cold, speed control equipment, 216; cold, X-ray gauge system, 363; continuous, drives, 476; design of stands, 363; drives, 230; drives, magnetic amplifiers for, 230; drives, rectifier, with field-reversal, 95; drives, reversing, rectifier-controlled, 94; drives and controls, for sheet temper, 230; experimental, instrumentation (B.I.S.R.A.), 229; for gear wheels, 476; instruments, 231; Jones and Laughlin's Aliquippa Works, 354; layout, 475;

Rolling Mills—*continued*
lubricants, action, 95; magnetic amplifier regulating systems, 363; mechanization of old-type, 95; Mo i Rana plant, 229; multi-roll, for thin strip, 230; Netherlands, 468; photothyratron indicator, 230; piercing, calculation for displaced piercing axis, 363; plate, modernization, 363; practice, 94, 229, 362, 475; practice, Ukraine, 217; practice and design, influence of research, 363; reversing, single-anode rectifier technique, 95; rod, at Continental Steel Corp., 363; rod, continuous, 3-stand, at Pueblo Works of Colorado Fuel and Iron Corp., 95; rod, at Jones and Laughlin's Aliquippa plant, 229; rolls. *See* Rolls; Sendzimir, at Calstrip Steel Corp, 230; sheet, investigation of working conditions, 229; sheet, Steel Co. of Wales, 24 (*Paper*); slabbing, Steel Co. of Wales, 24 (*Paper*); slabbing, ultimate capacity, 95; space heating, 476; Steel Co. of Wales Ltd., 362; strip, continuous, 363; strip, continuous, capacity rating of, 230; strip, continuous, determination of rolling pressures, 475; strip, continuous hot, electric power supplies, 476; strip, continuous hot, at Port Kembla, 468; strip, electrical equipment, 230; strip, at Port Kembla, 229; strip, reversing, electric equipment, 363; strip, Steel Co. of Wales, 24 (*Paper*); strip, tension measurement, 476; strip, thickness gauge control system, 95; strip, X-ray automatic gauge control, 230; tube, pilger mill, 230; tube, type KhPT-75, determination of stresses in, 230; universal working conditions of vertical rolls, 475

Rolls, cast iron, effect of molybdenum additions, 230; cast iron, unalloyed compound, production for rolling mills, 89; changing, reduction of idle time, 476; chilled cast iron, effect of molybdenum additions, 230; craze-cracking, 387 (*Paper*); determination of pressure on, 475; diameter, choice of, 363; faces, pressure distribution, 95; flour-milling, electrospark machining, 364; fractures, study, 475; heat-treatment in electric furnace, 93; iron, failures, 95; nylon, use in forming prefinished strip, 95; roll-neck lubrication, 364; temperature study, 475; use of hose coupling, 475; vertical working conditions, 475; wear resistance, 475

Roto-Flo Process, 230

Routt County (Colorado), geology and mineral fuels, 351

Royal Australian Navy, marine corrosion protection methods, 379

Royal Dutch Steelworks, Ymuiden sheet and tinplate works, 96

Rubber, corrosion, 493

Rudder, forging technique, 474

Ruhr, coals, production of coke from, 215

Rupture, Modulus, of, fireclay bricks, 83

Rupture Strength, tube steels, influence of vanadium, 238

Rupture Tests, long-term, 239

Russia, All-Union Steelmaking Conference, 217; by-product coking industry, 214; conference on construction of large-capacity coke ovens, 214; construction of large-capacity coke ovens, 214; corrosion research, 108; design and practice of open-hearth furnaces, 218; development of Bessemer process, 469; foundry industry, 470; interworks schools, 383; iron and steel industry, 111, 216; iron and steel industry (*Book*), 208; iron and steel industry, projected, in Siberia, 468; iron and steel industry in south-west, 382; low-grade iron ores, 351; planning department of Ferrous Metallurgy Ministry, 383; rod rolling, 476; steel-industry economics, 496

Rust, prevention, use of lead-base paints, 109; prevention characteristics, assessment, 244; protection, painting practice, 99; resistance, tinned steel, effect of repeated alkaline washing, 109; surface condition during de-rusting, 234; transformers, based on phosphoric acid, 234

Ruthner Process, 97

Ryan Aeronautical Corp., flame spraying of cermets, 236; inspection methods, 242; slow-speed sawing, 363

Safety and Health, air-pollution control in U.S., 111; blowing-in blast furnace, 469; carbon monoxide hazard, 471; effect of dust in industry, 111; explosion danger in electrolytic polishing, 97; fire prevention and protection methods, 496; foundry, 471; heat effects, 112; in heat-treatment plants, 93; occupational diseases, 383; ore and coal bridges, protective devices, 231; radiation precautions, 371; toxicity of metals, 380; welding with lime electrodes, 232; wire drawing machines, 475; *see also* Air Pollution

St. John Del Rey Mining Co., Ltd., mining activities, 80

Saint-Michel Blast Furnace, 496

Salt Baths, "Aja", 226; nitrate- nitrite, addition of water, 228; production control in Germany, 226; tempering of constructional steel, 360

Sampling, activity in foundries, 222; iron for carbon determination, 494

Sand, erosion, testing machine, 241; influence of distribution on penetration of grey iron into sand cores, 472–473; production and treatment, 224; *see also* Moulding Sands

Sand Blasting, 233; symposium, 234; tests, 468

Sand-Blowing Machine, model 288, 91

Sand-Slinger, action of head, 90; theory of working, 91

Sandwich Structures, honeycomb, 246

São Paulo, metallurgical industry, 383

Sawbrook Steel Castings Co., ladle practice for acid steel, 90

Sawing, hot, forces and work, 95; slow-speed, 363

Saws, chain, austempering of parts, 228

Scabbing, moulding sands, 224

Scale, blasting, 233; boiler tubes, 107; boilers, prevention, 493; effect in cup drawing test, 144 (*Paper*); formation, effect of lattice vacancies on, 367

Scales, oxidation-resistant, on Mo-base alloys, 489

Scaling, effect of environment, 488; heat-resistant casting alloy, 371; *see also* Oxidation

Scarfing, hot, with mechanical bloom turner, 231

Schack Metallic Recuperators, 352

Schieldrop Burners, 353

Schloemann Hydraulic Forging Press, 228

Science Museum, iron and steel gallery, 121

Scotland, iron and steel industry, 382; pig-iron trade (1844–48), 496

Scrap, annual statistics in Japan, 80; open-hearth, charging time, methods for decreasing, 87; preparation and contamination, 355; use in U.S.A., 86

Screw Machines, advantages and limitations, 100

Screws, hardening, 228

Sea Water, cathodic protection of steel in, 494; zinc corrosion, 380

Sections, drawing, 475; extruded, manufacture from metal powders, 100; rolling, 475; rolling, in Japan, 95

Sedac Instrument, depth measurement, 370

Segregation, carbon-steel ingot, 470; cast-iron, radiographic study, 372; flaws, in carbon-steel forgings, 474; micro, electrochemical method of defining, 490

Selas Corp., forge furnace, 360

Semicoke. *See* Coke

Sendzimir Rolling Mill, at Calstrip Steel Corp., 230

Separation, electrolytic, of carbides from steel, 372

Separators, cyclone, performance and design, 82

Serov Works, cost calculations in O.H. plant, 356

Servo-Mechanisms, in rolling mills, 230

Shafts, grooved, stress gradients, 484; photoelastic analysis, 484

Shaping, operations, research, 94

Shear. *See* Torsion-Shear Test

Shear Modulus, determination, at high temperatures, 239

Shear Tests, attachment to tensile machine 237

Shears, flying, mechanical design and electrical requirements, 69 (*Discussion*); sheet, Abbey Works, 45 (*Paper*)

Sheepbridge Engineering Group, production of centrifugal castings, 91

Sheepbridge Stokes, Ltd., cylinder liner production, 359

Sheet, for automobiles, production, 230; bending methods, 246; blanking, 474; coated steel and alternative materials, 235; coining and embossing, 362; deep drawing and spinning, 94; electro-zinc coated, 236; fabrication works, 475; finishing, control problems, 95; finishing equipment, 24 (*Paper*); hot-rolled, quality, 476; hot tinning, 236; iron and steel, enamelling, report of course, 366; iron and steel, production, 366; low-carbon steel, seam welding of dissimilar thicknesses, 232; magnetic, with orientated crystals, 103; manufacture from metal powders, 100; medium-carbon steel, formation of coarse-grained structure, 375; mild-steel, temper-rolled, anisotropy of strain ageing, 476; mild-steel, temper-rolled, effect of bending, 476; pressing, use of resins for tooling, 474; pressing and stamping, 362; pretreated, for vitreous enamelling, 98; prevention of welding during hot working, 94; Rockwell hardness testing, 487; roll forming, 363; rolling, thickness control, 95; selection for formability, 111; stampings, joining, 474; stampings, tolerances, 362; thin, thickness measurement, 231; tin-coated, 480; tinplating, finishing control, 95; transformer, hysteresis loss, 241; types, available, 476; working, examination requirements, 381; Ymuiden works, 96; zinc-coated, 480

Sheet Mills. *See* Rolling Mills

Sheffield, early ironmaking, 382

Sheffield High-Temperature Method, for determination of sulphur in coal and coke, 245

Shells, artillery, automatic finishing, 98; artillery, phosphate-coating retention during cold extrusion, 98; drawing and redrawing, 94; induction heating, for forging, 362

Shipbuilding, corrosion and corrosion protection, 108; non-destructive testing, 488; painting, 108; plate manufacture, 355

Ships, tankers, cathodic protection, 494

Shock Resistance, tests, statistical analysis, 383

Shore Hardness Tests, dispension of values, 485

Shrinkage, steel castings, 472

Sidelor-Micheville, coke-oven plant at Villerupt, 214

Sigma Phase, alpha $\rightleftharpoons$ sigma transformation in iron–chromium alloys, 106; effect of aluminium in iron–chromium

Sigma Phase—*continued*
alloys, 106; nucleation, in iron–chromium system, 375; occurrence in Cr–Ni steel, 289 (*Paper*); transformation in iron–chromium alloys, 376
Sigma Steel, for prestressed concrete, 496
Silica, determination, 246; determination in siliceous dusts, 110; dust, employers' obligations, 88; phases, 468; tridymitic, production, 83; *see also* Alumina/Lime/Silica Diagram; Refractory Materials (Silica)
Silicates, determination of aluminium in, complexiometric method, 492; surface tensions, 86
Silicides, properties, 377
Silico-Manganese, manufacture in electric furnace, 88
Silicon, behaviour, and effect on austenitic grain size in steel, 105; content, effect on risering of nodular iron, 358; determination in alloy cast iron, spectrochemical method, 495; determination in carbon steels, low-alloy steels and pig iron, spectrographic method, 495; determination in cast iron and steel, photometric method, 494; determination in high-alloy steels and alloys, spectrographic method, 491; determination in steel, photometric method, 109; effect on corrosion of iron, 244; effect on shrinkage of grey cast iron, 222; effect on temper brittleness, 370; effect of ternary additions on ordering reaction in iron–cobalt, 106; influence on sigma-phase in Cr–Ni steel, 289 (*Paper*); substitution for chromium in casting alloy, 371
Silicon Carbide, coatings, 366
Silicon Iron, 357; acid-resistant, study, 379; heat-resisting, 471; heat treatment, 226; magnetic domain structure in twinned crystals, 241; nitrogen diffusion and solubility, 106; prerefining, with oxygen in ladle, 220
Silver, diffusion in copper grain boundary, 374; effect in Cu–Ni–Zn alloys on wettability and brazed strength, 233; electrodeposition, change of cathode polarization, 365; films, mechanical-strength determinations, 484; *see also* Molybdenum–Silver Alloys
Sinter, mechanical properties, tests methods, 466; reproducibility of test results in experimental unit, 172 (*Paper*); self-fluxing, effect on blast-furnace operation, 469
Sintered Materials, elastic modulus, 240; *see also* Powder Metallurgy
Sintering, Bessemer and O.H. manganiferous sinters, 466; Cleveland ironstone, 434 (*Paper*); iron ore, 81, 466; iron ore, comparison of Dwight Lloyd process and rotary kilns, 81; practice, 81; *see also* Powder Metallurgy
Sintering Plant, Appleby-Frodingham, process control, 213; Dwight Lloyd, dust collecting system, 467; Kamysh-Burnsk, 213; leakage of air into fan system, 428 (*Paper*); Steel Company of Canada, 213
Site Engineering, corrosion and wear precautions, 380
Slabbing Mills. *See* Rolling Mills
Slags, analysis, polarographic, 246; analysis, spectrographic, 381; analysis, spectrographic solution methods, 217; basic Bessemer, relationship of chemical and mineralogical composition to solubility, 88; blast-furnace, for aluminium and Portland cement, 85; blast-furnace, foamed, production and uses, 85; blast-furnace, foaming and emulsion formation, 86; blast-furnace, non-oxidizing, surface structure and effect of sulphur, 217; blast-furnace, use as concrete aggregate, 85; blast-furnace, viscosity determination, 469; blast furnace and open-hearth, causes and control of foaming, 86; blast-furnace-type, $CaO–SiO_2–Al_2O_3$, rate of FeO reduction, 469; chromium recovery, 356; dephosphorization of iron with, 470; desulphurization of molten iron with, limiting stages, 220; desulphurization in slag-metal systems saturated with C, 355; determination of aluminium in, complexiometric method, 492; determination of phosphorus, radioactive method, 491; determination of sulphur, iodometric method, 495; effect on nitrogen content of steel in arc furnace, 470; effect on phosphorus content, 220; equilibria in ferromanganese production, 88; interfacial tension with iron, effect of carbon, 469; introducing radioactive phosphorus into, 495; iron losses in open-hearth furnace, 219; mechanization of retention and removal in hot-metal mixers, 469; metal recovery, 469; mixing with metal in O.H. furnace, 356; molten, corrosion, of pouring-pit refractories, 83, 215; molten, physico-chemical properties, 469; molten, properties of individual components, 220; molten, transfer numbers of calcium ions, 217; molten, treatment of steel by mixing with, Perrin process, 86; open-hearth, analysis, spectrochemical, 381; open-hearth, foaming and emulsion formation, 86; phosphatic, production in Talbot furnaces, 87; properties, judgment by appearance, 88; solid, steelmaking with, 356; steel-plant, manganese production, 86; sulphur distribution with flame in open-hearth furnace, 87; theory of, 221; titaniferous, analysis, 495; treatment and use, 85, 217, 469; viscosity during smelting ferro alloys in blast furnace, 221
Slip-Band Extrusion, 372
Slitting, stainless steel strip machine for, 230
Smith, A. O., Corp., aircraft propeller blades, fabrication, 363; precision forge-roll process, 363
Smith-Clayton Forge, Ltd., heat-treatment plant, 361
Smoke, 353, 467; dispersal, 467; recording smokemeter, 354; *see also* Air Pollution
Smythite, occurrence in calcite, 496
Soaking Pits, 93, 225, 360, 473; Abbey Works, 24 (*Paper*); electrically heated, 93; with regenerators (ARBED), 225
Soap Bubble Model, 367
Société Cockerill, gas engines for driving blast-furnace blowers, 214
Société Creusot, gas-producer plant, 353
Société d'Espérance-Longdoz, new blast furnace at Seraing-lez-Liège, 354
Société Mancelle de Fonderie, foundries, 358
Société Métallurgique de Gorcy, heat-treatment of rolls, 93
Soda Ash, desulphurization at nine works, 356; desulphurization of steel, 220
Sodium, determination in slags, polarographic, 246
Sodium Chloride, lattices, 374
Sodium Hydride, descaling with, 363
Sodium Sulphate, corrosion of stainless steel by, 243
Sodium Sulphite, addition to boiler feed-water, 244
Sodium Thiosulphate, etchant, for cementite and phosphorus, 373
Soil Probe, use for corrosion rate of iron in soils, 378
Solar Energy, furnaces for melting metals, 217
Solar Furnace, refractories, 468
Solid Solutions, calcium aluminoferrates, 469; creep and ageing effects, 485; supersaturated, evolution of structure during age hardening, 104; temperature-dependence of free energy of, 105
Solid-State Reactions, 491; study, use of microhardness measurements, 486
Solidification, castings, effect of mould material, 472; ingots, 470; steels, 225; steels, effects of gravity, 447 (*Discussion*); steel, in ingot mould, 356
Solids, crystalline, defects in, 374; crystalline, irradiation effects, 374; wetting effect and surface tension, 241
Solubility, carbon in iron, 52 (*Discussion*); carbon and nitrogen in iron alloys, 242; elements in titanium, 491; nitrogen in iron, 52 (*Discussion*); nitrogen, in silicon iron, 106; oxygen in Cr–Ni and Fe–Cr–Ni melts, 492; oxygen in water, 383; vanadium carbide in austenite, 492
"Sonizone" Ultrasonic Gauge, 370
South Africa, investment-casting foundry, 91
South California Edison Co., non-destructive testing of water-wheel generating unit components, 101
South Wales Foregmasters Taffs Wells, plant, induction heater, 474
'Southern' Wheel, for freight cars, 471
"Sovaco" Coke Blending and Crushing Process, 215
Spain, Cowper-stove and coking practice, 467; iron and steel plants, 217
Spares, selection for steel plant, 231
Sparks, temperature in hardening apparatus, 361
Special Steels, automobile industry, 495; development at Avesta Steelworks, 104; production in Japan, 356; review, 489; stress-corrosion-cracking resistant, 493; tube, seamless, 476
Specific Heat, nickel, 372
Specifications, American, anti-corrosion packing, 380; chromium–manganese–nickel steels, 357; coal tar, for underground use, 480; crane structures, permissible stresses, 231; electroplating, 235; faults and shortcomings, 482; in Japan, 367; pattern-making, 224; refractories, 468; steel, 237
Spectra, adsorption and emission, of CO, CO_2, 81; Bessemer flame, 355; influence of physico-chemical state, 109; iron and nickel, determination of strength of oscillations, 491; measurement with tube counter, 243; neutron-capture gamma-ray, of V, Co, Ti, Fe, Cr, Au, Mn, and I, 104
Spectrographic Laboratory, 491
Spekker Absorptiometer, use for determination of Cr, Mo and Ni, 245
Spheroidal Graphite Cast Iron, anti-friction properties, 223; behaviour of magnesium, 491; development and use, 92; high-silicon, heat-resisting, 471; induction surface hardening, 473; physical properties, 89; standardization by structure, 89; working, research in Russia, 89
Spheroidization, graphite in iron, 223
Spinning, 94
Spraying, airless spray plating, 480; aluminium, 108; aluminium, of alloy-steel engine valves, 236; aluminium, 'Alspray' process, 236; ferrous and non-ferrous metals on flat surfaces, 236; lacquer, 236; molybdenum, 236; process and applications, 236; technique and uses, 236; vacuum process, 236; wire, metal losses, 366; wire process, 236
Spring Steel, wire, weaving, 362
Springs, chromium steel, fatigue and relaxation tests, 246; laminated and helical, for road vehicles, 362; watch, manufacture, 372
Stabilization, austenite, 375
Stabilizing, 228
Staffordshire Iron and Steel Institute, Officers and council (1956–57), 79
Stahl und Eisen, 75th anniversary, *facing* 462, 463
Stainless Alloys, metallurgy, application to welding problems, 97; metallurgy and foundry practice, 222

Stainless Steel, AISI type 414 and type 431, mechanical properties at room and high temperatures, 242; austenitic influence of strain rate and temperature on ductility, 101; austenitic, intergranular corrosion, 493; austenitic, manufacture and properties, 106; austenitic, stress-corrosion cracking, 166 (*Paper*); basic arc-furnace practice, 87; brazing, with chromium nickel alloy, 233; classification and properties, 102; corrosion rating, 492; corrosion resistance, 379; corrosion by sodium sulphate, 243; corrosion testing, microscopic, 493; creep properties at high temperature, 368; crystal-boundary hardening, 106; deformed, microhardness measurement, 106; descaling, 233; determination of molybdenum, colorimetric method, 109; determination of Nb, Ta, Mo, W, and Ti, polarographic method, 110; drawing dies for, 475; effect of composition and structure on creep-rupture properties, 103; effect of ferrochromium in charge 357; elastic constants at high temperature, 484; films, analysis by X-ray emission spectrography, 488; forming, 362; heat-treatment atmospheres, 227; high-manganese, for nickel conservation, 104; influence of Nb and Ti, 372; intercrystalline corrosion, detection and testing, 493; intergranular corrosion, 378; intergranular oxidation in type 310, 489; low temperature properties, 485; nitrogen in, 356; passivity, 379; pickling, non-acid, 97; polarization in H_2SO_4, 489–490; progress in, 357; properties and fabrication, 357; review, 357; review of melting practices, 87; rolling, 476; selection and application in chemical industries, 246; selection of cold-rolled and hot-rolled low carbon sheet steels, 111; stress corrosion cracking, 239; strip, slitting machine for, 230; in sulphuric acid, electrochemistry of, 244; surface treatment, 365; titanium-stabilized, effect of heat-treatment on corrosion resistance, 106; tubes, electrolytic polishing, 98; types 347, cold-worked, creep rupture properties, 103; welding to low-alloy steel, 477; welds, effect of H_2, N_2 and O_2 on hot cracking, 364; welds, heat-treatment, 364; wire, preferred orientation and transformation $\gamma \rightarrow \alpha$, X-ray study, 274 (*Paper*); *see also* Chromium, etc., Steels

Stamping, 94, 228, 362, 474; advantages and limitations, 100; automobile bodies, 362; die, combined with machining, 474; rear axle housings, 228–229; spheroidal cast iron, 89

Stampings, sheet-metal, joining, 474; sheet metal, tolerances, 362

Standardization, grey-iron castings, 89; steel, in Germany, 111; ultrasonic testing, 370

Standards, alloy, for spectrographic analysis, 495; ceramic strainer cores (draft), 91; iron ores, proposals, 80; magnetic particle inspection, 486; production in foundry industry, 357

Statistical Analysis, applications, 383; in iron and steel making, 112; in operational research, 112; size and shape effects in fatigue, 103; spectrographic analysis, 491; structures with spherical grains, 373; use in steelworks, 383

Statistics, 111, 382, 496; analysis of experimental data, 246; application to research, 246; batch processes, study, 246; estimation of quality variations, 367; factorial analysis of tensile strength of cast iron, 368; fuel, world, 214; in quality control, in mass production, 247; quality control for steel bath tubs, 236; reproducibility of chemical analysis of non-alloy steels, 244; steel consumption and distribution in Sweden, 496; use for analysis of experimental data, 237; use in heat-treatment tests, 225–226; *see also* Iron and Steel Industry

Steam, cooling, convection flow, 96; high-temperature, materials for, 104; *see also* Carbon; Carbon/Carbon-Dioxide/Oxygen/Steam System

Steam-Carbon Reaction, catalytic effect of oxides, 353

Steam Generation, automatic controls on coke-oven gas fired boilers, 352

Steam Generators, distribution of dust and gas in atmosphere, 353

Steam Plant, bolt materials, 372; chromium creep-resisting steels for, study, 122 (*Paper*); demineralization, 108; testing of austenitic welds, 96

STEC Burners, 353

Steel, 15Kh and 12KhN2A, properties, 104; acid, foundry ladle practice, 90; acid, ladle practice, 90; aluminium coating, for increased oxidation and corrosion resistance, 98; analysis, 381; analysis, spectrochemical, 110; analysis, spectrographic, 491; arc welding for water turbine rotors, 232; austenitic, long term rupture tests, 239; austenitic grain size, effect of Al, iron nitrides and Si, 105; B.S. 970 specification En. 100, variation in fatigue properties, 178 (*Paper*); balanced, definition, 88; ball-bearing, production problems, 356; ball-bearing, studies on, 470; basic Bessemer, hydrogen content, 218; basic Bessemer, manufacture, 218; behaviour under hydrogen at high pressure, 371; bolt, for high-temperature service, 372; boron-containing. *See* Boron Steel; buried, cathodic protection, 107; buried, corrosion protection, 379; capped, definition, 88; carburizing, for gearing, 221; case-hardening, oxide inclusions in, 226; case-hardening and strengthened, effect of boron, 242; cast, types and uses, 224; casting, pouring system, 357; cathodic protection with sprayed aluminium coatings, 108; clad, diffusion, 494; cold-working studies, 490; comparison with Al and Mg, 111; consumption and distribution in Sweden, 496; continuous casting, 86; deformation. *See* Deformation; degassing, 359; delayed failure and hydrogen embrittlement, 102; desulphurization. *See* Desulphurization; determination of elements. *See* under name of specific element; die, for aircraft, 381; En, atlas of isothermal transformation diagrams (*Book*), 208; En, welding, 364; En 8 and En 19, effect of quenching and tempering on thermal conductivity and electrical resistivity, 10 (*Paper*); En 31, effect of quenching and tempering on thermal conductivity and electrical resistivity, 6 (*Paper*), 10 (*Paper*); Edgar Allen, introduction to France, 92; effect of nitrogen as alloying element, 371; effect of quenching and tempering on thermal conductivity and electrical resistivity, 6 (*Paper*), 10 (*Paper*); elastic constants, ultrasonic-diffraction determination, 370; electrical, 220; electrolytic charging, hydrogen occlusion and equilibrium hydrogen pressure, 102; electrolytic separation of carbides, 372; for enamelling, 366; equilibrium with CO and CO_2, 93; ferritic, for power stations, 381; forgeability, 94; free-cutting, 478; galvanized, welding, 477; hardness testing in ageing study on soft unalloyed, 369; heat-resistant, progress in, 357; heat-treatment, 473; heating, scale-free, by Equiverse system, 93; high-speed. *See* High-Speed Steel; high-strength, static fatigue, 103; high-temperature, for recuperators, 82; high-tensile, spot welding, 477; identification tests, 110; low-temperature properties, 369; market, 468; mechanical properties, axial dynamic load tests, 484; mechanical properties, effect of tempering temperature, 474; micro-hardness tests, 486; molten corrosion, of pouring-pit refractories 83, 215; nitric acid corrosion inhibitors, 494; non-magnetic, development and present position, 104; oxidation-resistant, types 300 and 400, Carpenter No. 10 and No. 20, and AM-350, 357; pearlitic, progressive etching effects, by electron microscope, 107; phase changes, magnetic study, 486; plastic deformation, inertia in, 238; for prestressed concrete, 111, 496; production, 86, 217, 355; properties obtainable by heat treatment, 227; properties in welded structures, 368; quality and standardization in Germany, 111; quench-ageing of soft unalloyed, radioactive-isotope study, 369; relationship between endurance limit and torsional properties, 101; SAE 1050, austenite-martensite transformation, 376; SAE 4140, effect of Cr deposits on fatigue strength, 479; SAE 4340, fabrication, 474; St 37, strain phenomena under cyclic bending, 482; selection, 372; selection for automotive gears, 489; semi-killed, definition, 88; slow-cooled, effect of alloy content, 489; solidification behaviour, 225; solidification, effects of gravity, 447 (*Discussion*); solidification in ingot mould, 356; special, review, 489; specifications, 237; stress corrosion by fatty acids, 380; surface defects, 102; tinned, effect of repeated washing with alkaline solutions on rust resistance, 109; transformer, aluminium-containing, 221; treatment, by mixing with molten slag, 86; ultra-high-strength, characteristics and applications, 111; vertical continuous casting, 86; weldable, impact tests on, 239; welding to aluminium, 477; welding in argon atmosphere with consumable electrodes, 97; welds, porosity, 97; yield point, influence of hydrogen, 102; *see also* under specific types of steel

Steel Bar. *See* Bar

Steel Castings, cement-sand methods, 224; comparison with forgings, 357; corrosion resistant, metallurgy and foundry practice, 222; defects, causes and remedies, 90; effect of nitrogen on solidity, 357; fracture types, 90; gating and running, and scabbing and porosity, 222; heat-treatment, 93; hot tearing, influence of moulding materials, 224; hot tears, study, 358; lost-wax process, feeding, 91; manufacture of high quality pressure type, in sand moulds, 224; pinholes, 473; plate, application of chills for neutralization of rib and boss hot spots, 92; plate, range of effectiveness of chills, 92; production methods at Massillon Steel Casting Co., 224; riser dimensions, determination, 225; risering, 359; risers, calculation of dimensions, 358; ruptures, metallographic study, 90; shrinkage, 472; solidification behaviour, 225; use and advantages in welded structures, 111; wheels for freight cars, 471

Steel Co. of Canada, sinter plant, 213

Steel Co. of Wales Ltd., Abbey Works, wide-strip rolling and sheet finishing equipment, 24 (*Paper*); aluminium-reduction determination of oxygen in steel, 185 (*Paper*); Margam Works, No. 4 blast furnace, 216; rolling equipment, 362; tinplate works at Velindre, 366; ultimate capacity of slabbing mills, 95

Steel Frames, use in small dwellings, 495

Steel Industry, automatic control, 96, 482; efficiency, 382; evolution of energy linked coal and steel industry, 469; long and short term prediction in economics, 496; Russia, economic conditions, 496; steel tariff, 382; *see also* Iron and Steel Industry
Steel Ingots. *See* Ingots
Steel Melts, temperature measurement and control, 82
Steel/Nitric-Acid Electrolysis, 491
Steel, Peech and Tozer, recent developments, 383
Steel Piling, corrosion protection, 243
Steel Plate. *See* Plate
Steel Powder, coarse, production and quality, 234
Steel Rod. *See* Rod
Steel Shavings, manufacture, 475; treatment and utilization, 219
Steel Sheet. *See* Sheet
Steel Strip. *See* Strip
Steel Structures, painting and protection, 99
Steel Tube. *See* Tube
Steel Wire. *See* Wire
Steelmaking, 355; All-Union Conference, 217; Conference, B.I.S.R.A., 463; developments of past decade, 86; economics for processes, 217; in German Democratic Republic, 355; history of, since Bessemer, 113 (*Paper*); influence of method on drawability of mild steel wires, 237; Japan, 217; 10th Junior Conference, 78; processes in U.S., 86; rare-earth additions, 87; with solid slag, 356; statistical comparison of methods, 383; use of oxygen, 469; *see also* Iron and Steel Making and under specific methods of steelmaking
Steelometer ST-7, 491
Steelworks, failures, theoretical analysis, 88; integrated, oil firing, 353; Netherlands, 468; transport, use of material-flow diagrams, 96; *see also* Iron and Steel Works
Stewarts and Lloyds, Ltd., Adelaide foundry, 470; pilger mill, 230
Stop-Off Coatings, strippable, 480
Storage Tanks, grain, 220,000-m³ capacity, 478
Stoves, hot-blast, efficiency, 82; hot-blast, German research, 82
Stoving, fuel economy, 480
Straightening, plate, 230; tubes, 230
Strain, effect on oxidation of chromium–nickel heater alloys, 489; measurement by X-rays, 368; phenomena under cyclic bending, 482; plastic, formation of lattice defects, 367; radiographic measurement, 240; radiographic and mechanical measurement in grey cast iron, 240; rate, influence on ductility of austenitic stainless steel, 101; transient fluctuations, elimination, 484; zero, directions in unstressed state, 242
Strain Ageing, alpha iron, 64 (*Discussion*); dislocation theory, 102; phenomenon of, 238; pure iron, 64 (*Discussion*); rimming steels, effect of vanadium, 369; temper-rolled mild-steel sheet, anisotropy of, 476
Strain Gauges, barium titanate, calibration, 487; ERS, applications, 483, 484, 485; ERS, creep in, 485; installation tool, 487; optical-polarization, 239; piezoelectric, 482; rings, for use with, 476; SR-4, influence of fluid pressure, 487; use under high fluid pressures, 487; use in testing boilers, 368
Strain Hardening, application of dislocation theory, 106, 483; discussion on Frank Read model, 483; theory, 483
Strain Tempering, K.R.K. process, 364
Straining, metals, by indentation, 22 (*Correspondence*)
Strains, determination in enamelled cast iron, 236
Strength, high-temperature, metallurgical aspects, 368; true, formulæ for, 239
Stress, allowable, for thin structural elements at high temperatures, 484; in blast-furnace steel structure and lining, 84; concentration problems, review, 482; determination in cold-rolling tube mill, 230; determination in structural members and pressure vessels, 483; distribution, in beams, 101; distribution, measurement by Geiger counter, 101; gradients in grooved bars and shafts, 484; in graphitic irons, 223; influence on flake formation in low-alloy steels, 102; internal, ball-bearing steel, effect of tempering temperature, 240; internal, in forging, 362; internal, in quenched steel cylinders, 368; internal, radiographic determination, 240; internal, X-ray measurement, 240; measurement in cast iron, 240; measurement, radiographic, directions of zero strain in unstressed state, 242; mechanical and thermal, in extrusion tools, 94; in projectiles during penetration, 484; radiographic measurement, 240; shear, determination in single crystals, 373; stability of materials under, 100; in structural elements, polarization-optical measurement, 239; thermal, behaviour of refractory materials under, 215; in transformation, 490
Stress Analysis, applications to torsion research, 482; photoelastic, for edge crack, 482; photoelastic methods, 484; use in casting design, 472; use in product performance, 102
Stress Corrosion, by fatty acids, applicability of Traube's rule, 380; use of zephirol etch, 490
Stress-Corrosion Cracking, austenitic stainless steels, 166 (*Paper*), 239; light alloys, 377; low-alloy steels resistant to, 493; mechanism, 492
Stress Relaxation, comparison of ring-shaped and cylindrical test pieces, 239; tests, method of pretreatment, 239
Stress Relief, cold-worked metal by annealing, 227; grey cast iron, 226; low-temperature, applied to penstocks, 97; *see also* Residual Stresses
Stress-Rupture Testing, high-temperature, of tubes, 487
Stress Strain Characteristics, carbon steel, X-ray measurement, 240
Stress-Strain Curves, laboratory tests, 482; at low temperatures, 452 (*Discussion*); relation with flat cylindrical indentation test, 488; strip, correlation with tension and compression, 484
Stresscoat, properties, 484
Strip, annealing furnaces, 227; cold forming of light-gauge sections, 94; cold-rolled, thickness gauge control, 95; continuous, electronic inspection, 476; continuous hot galvanizing, 235; deep-drawing properties, 369; determination of residual stresses in electropolishing, 483; effect of work hardening, 241; electro-zinc coated, 236; electron-microscope replicas, 104; forming of prefinished, use of nylon rolls, 95; handling equipment, hydraulic control systems, 363; hot-rolled, oxidation, 233; magnetic alloy, 489; mild-steel, pretreated, 98; polished, 'Mar Proof' coating, 236; rolling, tension measurement, 476; stress-strain curves, correlation with tension and compression, 484; thin, rolling, 230; transformer steel, rolling, 476
Strip Mills. *See* Rolling Mills
Structural Sections, cold formed, 230
Structural Steel, aluminium-sprayed, use and weldability, 109; brittle-fracture tendency, 488; effect of temperature of austenite formation, 376; hardening, 227; protective painting, 99; transformation, 360; weldability, 96; *see also* Constructional Steel
Structural Steelwork, evolution and trends, 495; paints for, 99
Structures, honeycomb sandwich, 246; for rolling mill at Mo i Rana, 96; stress determination, 483; welded, steel properties, 368
"Sulf-Inuz" Process, application to aeronautics, 227
Sulphates, anode passivation of iron in, 380
Sulphating, grey cast irons, 223; malleable cast irons, 223
Sulphides, inclusions, double etching for, 490; in metallic systems, thermochemical calculations, 496; surface impregnation, 477
Sulphur, action in polycrystalline structures, 473; activity in liquid Fe–Ni alloys, 87; behaviour in blast furnace, 85; in binary liquid solutions, 496; compounds, thermochemical transformations in coal during carbonization, 353; determination in carbon steel, 110; determination in coal, 110; determination in coal, use of 4-amino-4′-chlorodiphenyl hydrochloride, 245; determination in coal and coke, Sheffield high-temperature method, 245; determination, combustion method, 110; determination in minerals, slags, etc., iodometric method, 495; determination in steel, barium sulphate method, 110; determination in steel, statistical analysis, 244; determination in steel, use of induction-heating furnace, 110; determination in steel and cast iron, 244; distribution between flame and slag in open-hearth furnace, 87; effect on blast-furnace slags, 217; effect on corrosion of iron, 244; effect on shrinkage of grey cast iron, 222; iron-containing, attack by iron-saturated Zn, 235; organic, in coal, 82; pyritic and organic, behaviour during carbonization of coal, 353; reduction in pig iron, 85
Sulphur Cementation, 226
Sulphuric Acid, anodic behaviour of Fe–Cr alloys, 380; behaviour of Al–Cu alloy in, 378; microstructure of iron casting for handling, 378; passivation of chromium steel in, 365; pickling bath, energy relations, 479; pickling system and recovery, 479; recovery from waste pickling liquor, Ruthner process, 97; regeneration of pickling liquor, 234; stainless steel, electrochemistry of, 244
Sulphurizing Process, 226
Superheater, experimental, examination of tube sections, 242
Superheater Tubes, steels for, 381
Supersonic Testing, forgings and castings, 238
Surface Defects, types, 102
Surface Diffusion, review, 383
Surface Finish, measurement and selection, 478; methods of defining, 478–479
Surface Hardening, comparison of methods, 227; controlled nitriding, 227; crankshafts, 361; induction, 226; induction, of spheroidal graphite cast iron, 473; induction and direct gas heating methods, 361; influence of size on residual stresses, 473; methods, 361; purpose and results, 227; use of gaseous fuels, 352
Surface Layers, behaviour, X-ray study, 361; fatigue-strength evaluation, 369
Surface Tension, silicates, 86; solids, 241, 486; theory, 367
Surface Testing, methods and apparatus, 485
Surface Treatment, effect on wear resistance, 473; energy relations, 480; honing, 479; mild-steel strip, 98; nickel alloys and stainless steels, 365

Surfaces, corrosion of freshly formed, 493; strain phenomena under cyclic bending, 482; structure-dependent chemistry, 373
Suspension, electromagnetic, of molten zone, 111
Swansea and District Metallurgical Society, officers and council (1956–57), 79; secretary's address, 464
Sweden, early manufacture of Bessemer steel, 382; iron ores, formation of reaction skarn, 351; Malmberget, pelletizing plant, 81; metal finishing, 99; steel consumption and distribution, 496
Switzerland, electrodeposition, 99

Taconite, treatment in U.S., 351
Tafel Method, of calculating rolling extension, 229
Tankers, cathodic protection, 494
Tanks, brittle fracture of steel plates, 241; corrosion by hydrogen sulphide, 243; storage. *See* Storage Tanks; water, cathodic protection, 494
Tantalum, determination in stainless steel, polarographic method, 110; determination in steel, photometric, 381
Tappet, automobile, design, materials and lubrication, 246
Tar, for tar-dolomite mixtures, 467
Tata Iron and Steel Co., Ltd., works expansion, 86
Teeming, high-manganese steels, magnesite inserts for fireclay sockets, 88; temperature measurement and control, 82
Tees-side, iron and steel industry, 111
Television, application to steel industry, 367
Temper Brittleness, alloy steels, 370; chromium molybdenum weld metal, 232; effect of initial structure, 488; relation to internal friction, 369; use of zephirol etch, 490
Temper Rolling, mild steel sheet, properties, 476
Temperature, relation between composition and heat resistance, Cr–Ni–Ti alloys, 371
Temperature Coefficient, of corrosion reaction for buried iron, 107
Temperature Measurement and Control, 82, 215; automatic control of oil- and gas-fired furnaces, 354; calibration of instruments, 215; colorimetric, cobalt glass, 367; continuous, in Bessemer converter, 217; continuous, of converter baths, 86; electroplating vats, 99; in furnaces, 94; pyrometer, suction, 467; steel melts in furnace and during teeming, 82; techniques, 367; transient temperatures, measurement, 82; *see also* Pyrometers; Pyrometry; Thermocouples
Tempering, alloy carbides precipitated in 4th stage, 258 (*Paper*); ball-bearing steel, effect of temperature on internal stress of ring-type test pieces, 240; constructional steel, 360; effect of temperature on anisotropy of mechanical properties, 474; effect on thermal conductivities and electrical resistivities of steels, 10 (*Paper*); electrical methods, 225; hardened high-carbon steel, metallographic investigation, 105; high-carbon steel, 361; high-speed steel, transformations, 375; induction, 226; intermediate-stage process, 94; martensite, 489; molybdenum steel, carbide phase changes, 377; plain carbon steels, 148 (*Paper*); strain, K.R.K. process, 364
Templates, oxygen cutting, 97
Tenacity, measurement, 238
Tensile-Creep Properties, molybdenum–vanadium steel, effect of V-notch, 485
Tensile Properties, metals, 484
Tensile Strength, calculation in wire drawing, 368; cast iron test pieces, factorial analysis, 368; pre-determination in steel wire manufacture, 238; wire ropes with broken wires, 238
Tensile Testing Machine, attachments for compression, shear, torsion, and transverse bending, 237; attachments to IM-12A machine, 484
Tensile Tests, attachments to IM-12A machine, 484; boilers, vessels, etc., 484; deformation at high rates, 368; deformation of plastic metals, 482; determination of ductility of austenitic stainless steel, 101; effect of non-alignment of test piece, 238; high-temperature, errors in deformation measurement, 100; influence of deformation rate, 238; notch, 484; plastic deformation in, 483; pulsating, on welds between rolled steel sections and steel castings, 238; semi-automatic grips, 238
Tensiometers, single-roll and three-roll, 476
Ternary Systems, allotropic transformations, 491
Testing, adhesion strength, of metallized layer, 479; austenitic welds in steam plant, 96; boilers, electro-tensometric, 368; bond, 370; cast iron, 92; coal, 352; coke, 352; comparison of continuous and impulse wave methods, 241; cutting tools, 489; degreasing agents, 365; equipment, in France, 246; fluograph, above 150 kV, 370; grey iron castings, 222; magnetic particle, standards, 486; metallurgical techniques and apparatus, 237; moulding sands, 90; production control in Russia, 237; refractory materials, 216; simulated service, 487; sinter, 466; solution of buckling as guide to, 368; structural, directions of zero strain, 242; surface, methods and apparatus, 485
Testing Machines, IM-12A, attachments for high-temperature tensile and bend tests, 484; IM-12A, modifications, 484; IMCh-30 universal hydraulic, 237; IMCh-30 universal hydraulic, defects in, 239; instability, 100; NACA combined-load, 484; R-5, improved design, 367; *see also* under specific types of testing machine
Tests, 100, 237, 367, 482; acceptance, marine-engine castings, 371; axial dynamic load, on steels, 484; boiling nitric acid, 109; calorimetric, for determination of heat contents, 372; chill and wedge, for grey cast iron, 471; coatings, 98; coke, 82; concentration. *See* Concentration Tests; cup drawing, scale effect, 144 (*Paper*); electrical, on coal tar/enamel coatings, 236; hardenability, 488; heat treatment, 225–226; identification of steels, 110; indentation, relation with stress-strain curve, 488; laboratory, for predicting behaviour of metals, 482; sand blasting, 468; shock resistance, statistical analysis, 383; silica bricks, 468; torsion-shear, 484; wet grinding, 468; wrapping, 98; *see also* under specific types of test
Texas Electric Steel Co., ladle practice, 90
Thallium, heat of fusion, 372; heat of transformation, 372; monovalent, use in back-titration of alkaline permanganate, 245
Thermal Conductivity, insulating bricks, measurement, 83; manganese steel, 286 (*Paper*); metals, at low temperatures, 101; steel, effect of quenching, 6 (*Paper*); steel, effect of quenching and tempering, 10 (*Paper*); variability with temperature and pressure, 101
Thermal Expansion, metals, tables and charts for, 102
Thermal Insulation, use of synthetic resins, 83
Thermal Stability, heat-resistant materials, 104
Thermochemistry, alloys (*Book*), 247
Thermocouples, calibration, 215; Chromel–Alumel, 83; Chromel–Alumel, in creep-rupture testing, 487; fine-wire, for investigation of heat changes in magnetization, 103; furnace temperature measurement, 354; immersion, 82; immersion, molybdenum–tungsten, 467; types, 354
Thermodynamics, alloys (*Book*), 247; applied, numerical examples, 112; blast-furnace equilibrium, 84; carbon dissolved in iron alloys, 52 (*Discussion*); chemical equilibria data, 367; corrosion inhibition, 494; corrosion study, 380; descaling process, 363; electrochemical, 380; formation of nitrides, 373; heat content curve of substances, 372; non-metallic inclusions, study, 105; oxides, data at elevated temperatures, 83; properties of iron–gold alloys, 377; reaction of carbon and oxygen in liquid iron, 473; recording heat-content curves for thermodynamic analysis, 237
Thermometers, mercury, calibration, 215; resistance, calibration, 215
Thickness Measurement and Control, aluminium coatings, 236; chromium plating, use of interference microscope, 107; in cold-rolled strip production, 95; electronic instrument for thin sheet or wire, 231; gauges and allied instruments, 232; passivated zinc-coatings, 236; in rolling of steel sheet, 95; "Sonizone" gauge, 370; tin, X-ray, 488; use of radioactive radiation, 371
Thiokol Coatings, 236
Thionville, carbonization of Lorraine coals, 214
Thiourea Compounds, effect on dissolution rate of iron and mild steel, 494
Thomas, Richard, and Baldwins, Ltd., cold-mill drive, 476
Thomas Steel, for rail manufacture in France, 111
Thorium, compounds with transitron metals, 492
Time-Temperature Transformation Curves, use in hardening, 228
Timken 16-25-6, mechanical properties at elevated temperatures, 242, 489
Timken Roller Bearing Co., hot-scarfing machine, 231
Tin, determination in iron and steel, polarographic, 381; determination in tin, polarographic, 381; effect of trace amounts on annealing of blackheart malleable iron, 90; electrodeposition. *See* Tin Plating; electroplating in ultrasonic field, 365; heat of fusion, 372; *see also* Antimony–Lead–Tin Plating
Tin Alloys, electrodeposition, 480
Tin Plating, automation, 98; sheet, 480; sheet, finishing control, 95; theory and practice, 480
Tin–Zinc Alloys, coatings, corrosion resistance, 98
Tin–Zinc Plating, 365
Tinning, hot, fluxing process, 366; hot, of steel sheets, 236
Tinplate, cans, corrosion, 493; chromate treatment, 480; containers, manufacture, 98; electrolytic, in Canada, 235; electrolytic, X-ray thickness gauge, 488; manufacture, methods, 98; plant at Velindre, 366; quality testing, 480; sheet, finishing control, 95; Ymuiden works, 96
Titania, recovery from New Zealand ironsands, 351
Titanium, compounds, coatings, 366; descaling, 233; determination in carbon steels, low-alloy steels and pig iron, spectrographic method, 495; determination in cast iron and steel, photometric method, 494; determination in high-alloy steels and alloys, spectrographic method, 491; determination in slags, polarographic, 246;

Titanium—*continued*
determination in stainless steel, polarographic method, 110; determination in steel, concentration method, 110; effect in Cr–Co–Ni steel, 242; elastic constants at high temperature, 484; in enamelling, 366; frits, for coloured enamels, 237; hardness changes during heating, 240–241; in inclusions in iron, 62 (*Discussion*); influence on stainless steel, 372; neutron-capture gamma-ray spectra, 104; separation and direct determination, 245; solubility of elements in, 491; vacuum degassing, 360; vacuum melting furnaces for, 359; *see also* Manganese–Titanium Iron, 223

Titanium Alloy, determination of vanadium, amperometric method, 109–110

Titanium Carbide, cermets, microstructure and physical properties, 481; precipitated in 4th stage of tempering, 258 (*Paper*)

Titanium–Carbon System, 491

Titanium Steel, alloy carbides precipitated in 4th stage of tempering, 263 (*Paper*); boron-containing, properties, 221

Titanium–Vanadium System, 491

Tool Steel, bainite hardening, 227, 228; forging, 228; hard chromium plating, 365; hardening temperature, 228; hardness, 360; heat treatment, 228; heat treatment atmospheres, 227; high-speed development and heat-treatment, 93; high-speed, hardening, 94; high-speed, influence of carbide formation, 369; hot-work: composition, heat-treatment and properties, 357; hot-working, effect of heat-treatment on strength and notch toughness, 101; improvement of life and high-speed qualities, 473; low-temperature treatment, 360; mechanical properties, determination, 372; selection, 104; *see also* High-Speed Steel

Tools, cast high-speed steel, structure and properties, 88; cutting. *See* Cutting Tools; extrusion, mechanical and thermal stresses, 94; forging, craze-cracking, 387 (*Paper*); high-speed-steel, heat treatment, 228; high-speed-steel, nitriding, 227: pressing, hot and cold, manufacture by machining and hobbing, 474; pressing, nitriding 227: for strain gauges, 487; *see also* Cutting Tools

Torches, multi-jet, for heating for hot-forming, 475

Torquemeter, for measuring constant and variable torques in rotating shaft, 96

Torsion, application of electrical conducting sheet analogy, 484; research, applications of stress analysis, 482; shafts, photoelastic analysis, 484

Torsion-Shear Test, 484

Torsion Tests, attachment to tensile machine, 237; deformation during, electrical measurement, 239; low-alloy steels, 101; wire, machine for, 239

Toughness, quench-hardened low-carbon steel, 375

Toxicity, sources of contamination and assessment, 380

Trace, analysis, using radioactive isotopes, 244

Trace Elements, determination, spectroscopic, 245

Transfer Numbers, calcium ions in molten slags, 217

Transformations, allotropic, in ternary systems, 491; alpha $\rightleftharpoons$ sigma, in iron–chromium alloys, 106; austenite. *See* Austenite; austenite-martensite, 375; bainite, 373; diagrams, isothermal, atlas of (*Book*), 208; diffusion in iron–chromium system, 375; gamma $\rightarrow$ alpha, in stainless-steel wire, 274 (*Paper*): heat of. *See* Heat of Transformation; iron–chromium alloys, $\alpha \rightleftharpoons \sigma$, 376; iron–nitrogen system, 106;

Transformations—*continued*
isothermal, austenite-martensite, 490; lattice, irreversible iron–nickel alloys, 490; manganese steels, intermediate stages, 376; martensite. *See* Martensite; order-disorder in iron–chromium alloys, 376; order-disorder, iron–cobalt alloy, 106; order-disorder, kinetics of, 376; pearlite-austenite, 376; phase, in blast furnaces, 355; phase, role of structural impurities, 373; quartzite rocks, effect of surface area, 83; sigma-phase, in iron-chromium alloy, 376; stress accompanying, 490: structural steels, 360; temperatures, iron, 489; temperature, austenite-ferrite equilibria, 414 (*Paper*); in tempering of high-speed steel, 375; time-temperature, cast iron, 471; time-temperature, use in hardening, 228

Transformer Sheet, with orientated crystals, 103

Transformer Steel, aluminium-containing, 221; cold-rolled, production, 230; cold-rolling, 229; sheet, effect of heat treatment on hysteresis loss, 241

Transformers, core steel, rolling, 230; design and construction, 231; rolling of steel strip for, 476

Transition Metals, borides, carbides and nitrides, 372; thorium compounds with, 492

Transition State Theory, oxidation mechanism, 490

Transition Temperatures, iron, 489

Transport, cropped bloom ends from shears to converter, 363; foundry, aids for load attachment, 96; use of material-flow diagrams, 96; wire industry, 362; works, conference, 78

Traube's Rule, applicability to inhibiting action of fatty acids on stress corrosion, 380

Tréfileries et Laminoirs de Précision Gilbey-Fodor, pickling and heat-treatment shops, 365

Trilone B, use in determination of Ca and Mg in limestones and dolomites, 495

Tripoli, abrasive, 478

Tube, alloy steel, for high-temperature service, 104; bending, 228; boiler. *See* Boilers; chromium–nickel steel, welding, 478; cold-drawn, residual stress measurement, 240; drawing, 475; drawing, stresses, 229; drawing, theory, 229; drawing plant at Pacific Tube Co., 229; high-temperature stress-rupture testing, 487; iron, magnetic screening, 496; manufacture from metal powders, 100; pilger mill for, 230; plug drawing, 362; residual stress determination in butt joints, 368; rolling, on continuous mill, 476; rolling, determination of stresses in type KhPT-75 mill, 230; rolling, in Japan, 476; seamless, heat-treatment plant for, 226; seamless, site for mill in Brazil, 383; seamless, in special steels, 476; stainless-steel, electrolytic polishing, 98; straightening, 230; superheater, examination, 242; superheater, steels for, 381; use of rotating hearth furnace, 360; welding to tube sheets, 478

Tube Steel, influence of vanadium on creep and rupture strength, 238

Tungsten, determination in cast iron and steel, photometric method, 494; determination, gravimetric, with pyramidone, 245; determination in high-alloy steels and alloys, spectrographic method, 491: determination in stainless steel, polarographic method, 110; determination in steel, concentration method, 110; discharge of ions in cathodic polarization, 365; effect on isothermal decomposition of austenite, 106; effect on nucleation and growth of ferrite, 106; electrodeposition, 236; hardness changes during heating, 240–241; influence on creep resistance,

Tungsten—*continued*
104; wire, production plant, 383; *see also* Copper–Tungsten Alloys; Molybdenum–Tungsten Thermocouples

Tungsten Carbide, cermets, microstructure and physical properties, 481; separation from chromium carbide, 482

Tungsten Phosphide, Iron/Iron–Phosphide/Tungsten–Phosphide System

Tungsten Steels, boron-containing properties, 221; burnt, new intermediate phase, 105; determination of Mo, colorimetric, 381

Tungsten-Strip Lamps, calibration, 215

Turbines, blades, buckets and vanes, manufacture, 496; blades, vacuum-melting process, 87; rotors and blades, investment-cast, 381; shaft failure, 487; steam, blading, manufacture, 97; steam, shafts, reversible bending, 102

Turbo-Compressors. *See* Compressors

Turnings, treatment and utilization, 219

Tuxedni Bay (Alaska), magnetite deposits 466

Tyres, forging, 474

Ugine-Sejournet Extrusion Process, 94, 475

Ukraine, iron and steel production, 217

Ultrasonics, application to electroplating and cleaning, 479; application to solvent cleaning, 233; cleaning, 365; cleaning of metals, 98; diffraction determination of elastic constants, 370; effects on heat treatment of steel, 93; electrodeposition in ultrasonic field, 365; flaw detection by contact scanning, 370; impact grinding, 364; inspection in aircraft industry, 370; in metallurgical and mineral dressing processes, 351; "Sonizone" thickness gauge, 370; testing, review, 241; testing, in shipbuilding, 488; testing, standardization, 370; weld testing, 371

Unimul Burner, 353

Union Steel Corp. (of South Africa) Ltd., open-hearth steelmaking, 410 (*Paper*)

United Kingdom, coal production and utilization, 214: steel tariff, 382

United States, air pollution, legal and health aspects, 111; blast-furnace construction, 468; coke industry and by-products, 352; coking industry, injuries, 352; electric steel production development, 356; electroplating developments, 99; iron-ore requirements, 80; iron-ore supplies, 80; iron-ore treatment, 351; manganese deposits, Tombstone District, Cochise County, Ariz., 80; manganese exploration in Philipsburg District, Granite County, Mont., 80; rolling mills, 229; specifications for anti-corrosion packing, 380; steelmaking processes, 86; use of scrap, 86

United States Steel Corp., strip mill gauge control, 230

Units, systems, 367

Universal Pattern Co., (London), Ltd., development, 224

Upset Forging, at American Brake Shoe Co., 94; cold, tests on aluminium-killed steel, 474: electric, axle shafts, 362; hot, ductility during, 228; methods and design, 474

Uranium, in iron meteorites, study, 112

Utica Drop Forge and Tool Corp., vacuum furnaces, 87

V-Notch, effect on tensile-creep behaviour, 485

Vacuum Degassing, 221

Vacuum Furnace, for study of structure, 377

Vacuum Fusion, metal purification, 225; techniques for production of pure metals and alloys, 357

Vacuum Melting, determination of gases in steels and cast irons, 110; process and application, 87; of steels, 88
Vacuum Metallizing Process, 236
Vacuum Metallurgy, 359; applications, 359; casting methods, 359; degassing of metals, 359; degassing of titanium, 360; deoxidation of vacuum-melted M252, 359; determination of vapour pressure, 360; distillation of non-ferrous metals, 360; economics, of vacuum melting, 359; furnaces and heat-treating atmospheres, 359; graphite formation during vacuum heat-treatment, 359; hydrogen deoxidation of vacuum-melted alloys, 359; impact properties of vacuum-melted Fe–Cr alloys, 359; iron alloys, vacuum melting, 359; melting furnaces, 359; melting methods, 359; press forging, 359; production of ductile Fe–Al alloys, 102; pumps, 359; review, 359; solid-state purification of Mo, 359; symposium, 359; zirconium, vacuum-melted, 359
Valley County (Idaho), electric smelting of ilmenite concentrates, 217
Valves, automotive, application of 'Al-spray' process, 236; engine, Aldip coating, 366; engines, alloy-steel, aluminium spraying, 236; hot-blast, for blast furnace, 468; hot-blast, questionnaire, 84
Van de Graaf, X-ray generator, 371
Vanadium, determination in cast iron and steel, photometric method, 494; determination, ferricyanide ceriometric, 244; determination in high-alloy steels and alloys, spectrographic method, 491; determination in high-Cr steels, potentiometric, 244; determination in steel, concentration method, 110; determination in steel, polarographic, 381; determination in titanium alloys and alloy steels, amperometric method, 109–110; determination of vanadium^{V} by hydrazine, 245; effect in Cr–Co–Ni steel, 242; effect of strain-ageing of rimming steels, 369; influence on creep and rupture strength of tube steels, 238; neutron-capture gamma-ray spectra, 104; structure of carbide phases in, 482
Vanadium Carbide, precipitated in 4th stage of tempering, 258 (*Paper*); solubility in austenite, 492
Vanadium Oxide, catalytic effect on steam-carbon reaction, 353
Vanadium Steel, alloy carbides precipitated in 4th stage of tempering, 263 (*Paper*); carbide formation, 492
Vapour Pressure, determination, 360
VEB Maxhütte Bloomery Furnaces, 473
Ventilation, electrical equipment, 363; equipment, corrosion, 493; foundry, 471
Verein Deutscher Eisenhuttenleutte, presentation by Council of Iron and Steel Institute, *facing* 462, 463
Vibration, processes, automatic recorder for, 369; torsional, frequency calculations (*Book*), 247
Victoria, stray current electrolysis, 378
Viscosity, blast-furnace slags and minerals, determination, 469; enamel glasses, 236; slags, during smelting of ferro alloys, 221
Vitreous Enamel. *See* Enamel

Wagons, railway. *See* Railways
Washing, alkaline, effect on rust resistance, 109
Watch Springs, manufacture, 372
Water, corrosion, magnetic treatment apparatus, 108; corrosion inhibition of ferrous metals in, 109; oxygen solubility, 383; purification with activated carbons, 479; steelworks requirements, 231; tap, passivation of chromium steel in, 365; zinc corrosion, 380
Water Tanks, cathodic protection, 494
Water Turbines, rotors, arc welding of steels for, 232
Water Vapour, effect on reaction between CuO and Fe or Fe_3O_4, 107
Watertown Arsenal, shell moulding, 359
Waunakee Alloy Casting Corp., foundry, 359
Wear, cutting-tool, radioactive isotope study, 233; diamond wire-drawing dies, 362; dies, 488; gears, measurement, 370; machine parts, determination using radioactive indicators, 241; machine parts, quantitative determination, 370; means of minimizing, 370; metal transfer, 103; precautions in site engineering, 380; tests metallic and non-metallic materials, 103
Wear Resistance, carbon steels, 488; copper steels, 103; cutting tools, investigation with radioactive isotopes and irradiation, 97; effect of residual stresses, 488; effects of surface treatments, 473; influence of residual stress, 239; iron alloys, influence of nitriding, 361; rolls, 475; by sand erosion, testing machine, 241; sulphurizing process, 226; use of sulphide-impregnated surfaces, 477
Weaving, spring steel wire, 362
Wedge Tests, use for melting grey cast iron, 471
Weighing, continuous methods and control, 232
Weld Metal, chromium–molybdenum, temper brittleness, 232; cracking in high strength, 232; modified type, 347; mechanical properties, 97; notch-tough overlays, use for crack arresting, 97
Weldability, aluminium-sprayed steel, 109; chromium–manganese–molybdenum nickel steels, 96; copper-manganese steel, 477; rimming steel, 477; steel pipe, resistance-welded, 96
Welded Joints, calculations for static loads, 364; dissimilar metals, simulated service testing, 487; pipe, tensile tests, 484
Welded Structures, non-destructive testing, 371; properties of steel for, 368; research and experience, 477; use and advantages of steel castings, 111
Welding, 96, 232, 364, 477; aero-engines, mechanized, 364; arc, of aluminium to steel, 477; arc, in CO_2 atmosphere, 477; arc, distortion, 96; arc, of low carbon steel, selection of electrodes for, 233; arc, requirements for carbon and low-alloy steels, 477; arc, of steels for water turbine rotors, 232; arc, temperature of droplets of molten electrode metal during, 232; arc energy, fillet size and amounts of electrode used, 97; argon arc process, 232; automatic arc in pipe production, 232; blast furnace construction, 232; blast furnace and equipment, 354; butt, automatic pressure, of pressure pipelines, 478; chromium–molybdenum–nickel alloys, 357; chromium–nickel steel, 477; chromium–nickel steel piping and tubing, 478; clad steels, 96; Elin Haferguth submerged arc process, 232; fatigue in welded components, 232; fusion, structural steel, 96; fusion, for vitreous enamelling, 480; fusion pressure, of steel sections for reinforcing concrete, 96; galvanized steel, 477; heat-resisting steels, 232; hidden-arc, of railway wagons, 478; impact tests on steels for, 239; inert-gas, pressure piping on site, 478; inert-gas-shielded metal arc, 232; inert-gas-shielded metal-arc, electrode activation, 97; inert-gas tungsten-arc, of piping, engineering aspects, 97; iron and mild steel, 469; manganese steels, 477; metallurgical aspects, 97; mild steel, brittle fracture, 364; modern practice, 477; oxy-acetylene, 477; oxy-propane, 477; pipeline, Trans-Arabian, 364; in propellers, 363; rear axle housings, 228–229; recommendations for steels and other materials, 364; research difficulties, 478; resistance, review of progress, 232; resistance, of steel pipe, 96; seam, of dissimilar thicknesses of low-carbon steel, 232; seam, of low-alloy to stainless steel, 477; sheets, prevention during hot working, 94; spot, argon arc, 233; spot, of high-tensile steels, 477; spot, of low-alloy to stainless steel, 477; spot, series, measurement of shunting currents, 97; steels, in argon atmosphere with consumable electrodes, 97; storage tanks for grain, 220,000-m^3 capacity, 478; straight-polarity inert-gas process, of mild steel, 477; tubes to tube sheets, 478; use of argon and helium, 469; use of composite models, 364; use of oxygen, 469; use of propane, 96
Welding Electrodes, activation, for inert-gas-shielded metal-arc welding, 97; arc, 364; arc, for low carbon steel, 233; arc, review, 364; arc, review of progress, 232; austenitic, notch impact values, 96; basic lime, effect on health of operator, 232; chromium–molybdenum, for pressure piping, 478; consumable, for welding steels in argon atmosphere, 97; for copper steels, 477; for Cr–Ni–Si Alloy, 364; effect of I^2R heating, 478; evaporation in d.c. arc, 364; for mild steel, 477; selection, 364; temperature of droplets during arc welding, 232
Welds, analysis, in high-alloy steels and heat-resisting alloys, 495; austenitic, in steam power plant, testing and proving, 96; behaviour between rolled-steel sections and steel castings during pulsating tensile test, 238; hot cracking, 364; hot cracking, influence of Mn, 364; inspection, use of temperature-indicating material, 96; non-destructive testing, 371; spot, in low-alloy steels, quality test, 484; stainless steel, effect of H_2, N_2, and O_2 on hot cracking, 364; steel, porosity, 97; surfaces, stainless-steel, heat-treatment, 364
Wellman-Galusha Producer Installation, 215
Westinghouse Electric Corp., metallurgical plant at Blairsville, 112; metalworking plant, 94; special-production and development work, 94
Wetting, effect on solids, 241, 486
Wheeling Steel Corp., continuous hot galvanizing plant, 235
Wheels, cast-steel, for freight cars, 471; centrifugal-casting machine, for, 91; railway, tyres, production and faults, 242; rims, cropping of ingots for, 357; water-, testing of generating unit components, 101
Whessoe Gas-Cleaning Plant, 215
White Cast Iron, Ni-hard martensitic, applications, 223; structure, properties and applications, 471
White Metals, metallurgy of, 246
Whitehead Iron and Steel Co., Ltd., electrical equipment of strip mill, 230
Willamet Iron and Steel Co., car-hearth type furnace 225
Winding Drums, moulding and casting, 472
Wire, cable, fatigue-testing machines, 368; carbon-steel, mechanical properties at low temperatures, 452 (*Discussion*); continuous strand-annealing and galvanizing plant, 365; fine, technology of manufacture, 94; flattening, 362; hot-dip galvanizing, 235; influence of adsorbed gases, 484; netting, construction, 362; predetermination of tensile strength, 238; spraying, metal losses, 366; spraying process, 236; spring steel, weaving, 362; stain-

Wire—*continued*
less-steel, preferred orientation and transformation $\gamma \rightarrow \alpha$, X-ray study, 274 (*Paper*); test pieces for corrosion-fatigue testing, 369; thickness measurement, 231; torsion testing machine, 239; transport, 362; tungsten, production plant, 383; wool, manufacture and uses, 475
Wire Drawing, counter-tension, 475; die generated by conical section, 362; dies, diamond, wear, 362; influence of steelmaking method, 237; physical structure of Ca $(OH)_2$, 229; reel drive selection, 229; tensile strength calculation, 368
Wire-Drawing Machines, multi-hole, calculation of performance, 475; self-aligning arrangement, 475
Wire Industry, maintenance organization, 475
Wire Mills, Companhia Siderurgica Belgo-Mineira, 94; productivity, 94
Wire Ropes, calculation of weakening due to wire breaks and wear, 238
Wood, Alan, Steel Co., modernization of plate mill, 363; rotary-hearth slab-heating furnace, 93
Work-Hardening, compressible plastic materials, 103; influence on properties of steel strip, 241
Work-Softening, effects in straining of metals by indentation, 22 (*Correspondence*); effects on permenant-magnet alloys, 241
Working, cold, low-temperature recovery phenomena, 106; cold, properties of basic Bessemer steel, 86; cold, recrystallization and grain growth, 489; cold, stored energy and lattice defects, 374; cold, studies on Al single crystals and steel, 490; cold, use of hydraulic and crank presses, 474; hot, effect on magnaflux test, 241; hot, sheet, prevention of welding, 94; hot or cold, selection, 227; plasticity phenomena, 103
Works Laboratory, organization, 243
Wrapping Equipment, electrostatic precipitation, 477
Wrappings, tests, 98
Wrought Iron, historical development, 382
Wüstite. *See* Calcium–Oxide/Wüstite System

X-Ray Analysis, emission spectrography, 488; spectral, with counting tube appliances, 242
X-Ray Apparatus, cameras, 487; high-resolution, fine structure, 104; powder-diffraction, 223
X-ray Diffusion, in iron–chromium system, 375
X-ray Equipment, 242
X-ray Microscopy, principles and development, 104
X-ray Studies, application to metals, 101; behaviour of surface layers in carbon steel, 361; carbide phases in V, 482; detection of austenite, 487; determination of soundness of castings, 101; determination of total deformation, 240; fatigue, 240; ferrite crystals, effects of alloying elements, 482; goniometric investigations of crystals, adaptor for, 487; intensity measurements, photometer for, 488; measurement of internal stress, 240; metal deformation, 104; oxide structures, 488; preferred orientation and transformation $\gamma \rightarrow \alpha$ in stainless-steel wire, 274 (*Paper*); strain measurement, 240, 368; strain measurement in grey cast iron, 240; stress measurement, 240
X-Rays, gauge system for cold reduction mill, 363; image intensifier tube, 242; line broadening from cold-worked iron, 101; safety precautions, 371; strip mill gauge control, 230; tin thickness gauge, 488; uses in iron and steel production, 371; Van de Graaf generator, 371
Xeroradiography, 241, 488

Yield, behaviour at low temperatures, 452 (*Discussion*)
Yield Point, in ageing of temper-rolled mild steel, 476; determination by sound propagation, 368; dislocation theory, 482; steel, influence of hydrogen, 102
Yield Rate, mild steel, 237
Yield Stress, determination in cold rolling, 484
Yielding, 100; delayed, of mild steel, effect of temperature, 101

Zephirol Etchant, 490
Zinc, anodes, use in cathodic protection of conduits, 108; behaviour in blast-furnace, 216; conversion coatings on, 235; corrosion in waters, 380; determination in plating baths, potentiometric method, 479; determination in presence of Fe and Ni, ion-exchange, 381; determination in slags, polarographic, 246; electrodeposition, change of cathode polarization, 365; iron-saturated, attack on iron-containing S and P, 235; iron-saturated melts, attack on iron, 480; metallic, as corrosion protector, 108; paint, 235; removal from galvanized iron, 365; vacuum metallizing, 236; wire spraying, metal losses, 366; *see also* Galvanizing
Zinc Coatings, application methods, 235; comparison with cadmium, 235; electrodeposition on sheet and strip, 236; passivated, thickness determination, 236; *see also* Galvanizing
Zinc Cyanide, recovery, 365
Zinc Plating, barrel, plant, 235; Nitec process, 98; sheet, 480; solutions, spectrographic analysis, 495; structure of deposit, 98; *see also* Tin–Zinc Alloys
Zircon, coatings, 366; refractory properties, 216; sand, properties and foundry applications, 224
Zirconia, coatings, 366
Zirconium, determination in steel, concentration method, 110; vacuum-melted, 359
Zone Melting, 220, 225; pure compounds AB, 478

NAME INDEX

NOTE—Names with prefixes will be found under the initial letter of the prefix, the prefix and the remainder of the name being considered as one word for alphabetization.

Double-barrelled surnames are indexed under the first name of hyphened names, and under the second name of unhyphened names.

Aaronson, H. I., precipitate morphology, 375
Abd El Wahed, A. M., and **M. Pourbaix**, corrosion and protection of iron in presence of chlorides, 380
Abele C, G., *See* Johnson, R. F.
Abger, Th. and **K. Schutz**, autogenous cutting of special pipe sections, 478
Aborn, R. H., toughness of low-carbon steels, 375
Abramov, I. V., metallurgical furnaces, 93
Abramski, C., production of special cokes, 352
Adachi, A., and **Z. Morita**, distortion of ball-bearing steel after heat-treatment, 93
Adachi, M. *See* Konishi, I.
Adair, R. V. *See* Ernst, C.-E.
Adams, C. L., Russian foundry industry, 470
Adams, C. M. *See* Sullivan, E. J., jun.
Adams, E. M., air pollution, 467
Ades, M., cleansing metal surfaces before electroplating, 234
Afanas'ev, S. G., anniversary of Bessemer process, 469
Agar, A. W., and **R. S. M. Revell**, Formvar replica process, 104
Aguet, A., Sulzer axial blowers, 355
Aikazyan, E. A., and **A. I. Fedorova**, coefficient of diffusion of hydrogen, 102
Aiyengar, N. K. M., magnesite, 354
Aizenshtok, I. Ya. *See* Ipatov, N. K.; Kolosov, M. I.
Akamatsu, K. *See* Sawamura, H.
Akasu, H. *See* Owaku, S.
Akimoto, T., and **S. Onishi**, cinders as pig-making material, 216; pyrites cinders, 81
Akimov, G. W., electrode potentials, 243
Aksenova, A. V. *See* Sukhenko, K. A.
Albert, P., radioactive tracers for high purity metals, 109
Albrecht, C., electrolytic carburization, 226; oxidation at the surface of case-hardening steels, 226; temperature ranges and construction of furnaces, 93
Alder, K. F., corrosion in nuclear reactors, 378
Alderton, G. W. *See* Carlisle, S. S.
Alekseenko, M. F., and **G. N. Orekhov**, Cr–Ni–Mo steel type 40 KhNVA, 88
Alexander, E., and **B. S. Fraenkel**, integrating photometer for X-ray intensity measurements, 488
Alfimov, A. N., and **A. P. Gulyaev**, martensite transformation, 375; velocity of martensite crystal growth, 105
Alimov, A. G. *See* Osipov, A. I.
Allan G. W. C., gas-producer practice, 215
Allard, N., and **G. Husson**, refining of phosphorus pig iron, 86
Allen, N. P., creep and fracture at high temperatures, 485; metals at low temperatures, 452
Allen, N. P., and **C. C. Earley**, *Paper*: "Effect of Phosphorus Content on Impact Value of Fully and Partially Hardened and Tempered Mn–Mo Steels." *Discussion*, 456. *Correspondence*, 458. *Author's Reply*, 458, 461
Allen, N. P., B. E. Hopkins, and **J. E. McLennan**, tensile properties of single crystals of high-purity iron, 105
Allsop, H., response of steel to induction hardening, 361
Allsopp, H., ingot structure, 451
Almborg, V., foundry buildings and plant, 92
Almond, J. K., vibrational waves, 351
Almunia y de Leon, J., 'Fauderias' in Spain, 382
Alquier, L., containers of tin plate and glass, 98
Alvey, W. H., modern forging presses, 193
Ambler, H. R., and **A. A. J. Bain**, corrosion of metals in tropics, 109
Amison, W. T., distortion in welding, 96
Ammareller, S. *See* Opitz, H.
Anders, H., lacquer spraying, 236
Anderson, E. F., furnace fume collector, 231
Andrade, E. N. da C., creep, 484
Andreev, E. I. *See* Plokhov, V. N.
Andreeva, A. V. *See* Krushchov, M. M.
Andreeva, L. P., spectrographic analysis, 491
Andrew, K. F. *See* Gulbransen, E. A.
Andrews, A. H., materials handling in steel plants, 363
Andrews, A. S. *See* Yee, T. B.
Andrews, K. W., *Paper*: "The Calculation of Transformation Temperatures and Austenite-Ferrite Equilibria in Steels," 414; *Paper*: "An X-Ray Examination of Preferred Orientation and the Transformation $\gamma \rightarrow \alpha$ in a Stainless-Steel Wire", 274; alloy steels, 459; *see also* Gemmill, M. G.; Pryce, L.
Angeli, M., determination of magnetite in ores, 351
Angles, R. M., electrodeposition of tin and tin alloys, 480
Angus, H. T., carbon monoxide hazard, 471
Anschütz, H., rectifier drives for reversing rolling mills, 95
Antipov, M. I., planning, 383
Antonio de Araujo, L., refractories for iron and steel industry, 83
Antonov, V. K. *See* Chufarov, G. I.
Antonovich, A. V., automatic recorder for vibration processes, 369; high-temperature hardness testing, 486
Antsÿferov, I. K., resistance to wear of steel rolls, 475
Apaev, B. A., calculating quantity of austenite in systems, 486
Apraig, J., stainless steels, 102
Apraiz, J., intergranular corrosion of stainless steels, 493
Arakawa, M., K. Yasui, and **T. Fujie**, determination of C and S in steel, 110
Arantes, A. A., theory of dislocations, 106
Arblaster, H. E., and **P. F. F. Thompson**, corrosion protection of airframe components, 379
Arbuzov, V. A. *See* Vasil'ev, D. I.
Archer, R. S., V. A. Crosby, and **G. A. Timmons**, carburizing steels for critical gearing, 221
Aristov, G. G., refractories for bottom pouring of steel, 354
Armstrong, T. N., and **J. W. Crossett**, Ni–Cu low-alloy steels, 372
Arnds, W., fusion pressure welding of steel sections for concrete, 96
Arnold, T. H., delta-ferrite, 57, 59; siliceous and titanium-bearing inclusions, 63
Aronov, S. G., and **L. I. Nesterenko**, coke formation and coal charging, 353
Arsenishvilil, A. Yu., S. G. Boiko, M. A. Kekelidze, V. V. Perova, B. F. Filonenko and **A. N. Tsaritsyn**, production of ferromanganese using Chiatursk carbonate manganese ores, 221
Arshinov, F. L., and **M. I. Knyazev**, intensifying the sintering process, 466
Artemenko, N. S. *See* Pogodin-Alekseev, G. I.
Arterburn, N. R. *See* Holland, J. W.
Arwidson, S., thermal stability and heat-resistant materials, 104
Asada, Y., raw materials for iron manufacture in Japan, 80
Asakawa, Y., breaking strength of metals, 483; formation of mechanical properties, 490
Asanuma, M., and **S. Ogawa**, magnetic ageing of pure iron, 370
Ascher, E. *See* Perrier, A.-L.
Ascough, H. H., *Paper*: "Maximum Utilization and Problems of Wide-strip Rolling and Sheet Finishing Equipment," 24
Ashton, M. D. *See* Savage, L. H. W.
Ashton, M. D., R. F. Perkins, and **L. H. W. Savage**, *Paper*: "The Cooling of Rimming-Steel Ingots between Teeming and Stripping." *Discussion*, 443. *Author's Reply*, 446
Astier, J., ore reduction processes, 86
Astrov, E. I., and **V. N. Biryukova**, effect of heat-treatment of titanium-stabilized 18–9 Cr–Ni stainless steel, 106
Athanikar, S. G., moulding in Indian foundry, 91
Atiasov, A. G. *See* Klyachko, Yu. A.
Atterton, D. V., carbon-dioxide process, 358
Atterton, D. V., and **C. Edmonds**, exothermic materials, 358
Atwell, J. F., metal spraying, 236
Aubrion, G., heat-treatment of cast irons, 227
Aubry, J., and **F. Marion**, composition of ferrous oxide, 107
Auld, J. H. *See* Garrod, R. I.
Auphan, J., prevention and protection against fire, 496
Austin, C. R. and **W. W. Kerlin**, heat treatment of grey iron castings, 357
Avdeev, B. A., Russian-produced machines and instruments for testing, 100
Averbuch, N. I., and **F. W. Miroschnitschenko**, casting roundabout engine face plate, 359
Averbukh, B. D. *See* Chufarov, G. I.
Averchenko, P. A. *See* Pronin, V. E.
Averin, V. V., A. Yu Polyakov, and **A. M. Samarin**, activity of oxygen in liquid iron, 219
Avila, C. F., and **A. B. Jones**, corrosion in electric utility systems, 108
Ayres, W. P., P. H. Vartanian, and **J. L. Melchor**, frequency doubling in ferrites, 481
Ayusawa, S. *See* Oka, Y.
Azarov, K. P., quality of steel for enamelling, 366
Azou, P., measurement of tenacity, 238

Badaluco, J., Tripoli as abrasive in buffing compounds, 478

Bader, O., and **D. Godot**, inoculation of irons, 472
Bacalu, S. Ph., manufacture of ferro- and silico-manganese in electric furnaces, 88
Bacon, C. H., obituary, 462
Baenziger, N. C. *See* Florio, J. V.
Baerlecken, E., and **H. Fabritius**, magnetic properties of Fe–Cr alloys, 241; transformation of σ-phase in Fe–Cr alloy, 376
Baeslack, A. J. *See* Cameron, J. M.
Bagenstose, A. H., jun., asphaltum mastic coatings, 236
Bagley, K. Q. *See* McIntosh, A. B.
Bagshawe, B., and **A. L. Pill**, determination of S in steel, 110
Bailey, W. H. *See* Briggs, P. R. A.
Bain, A. A. J. *See* Ambler, H. R.
Baker, J. F., and **C. F. Tipper**, notch tensile test, 484
Baker, R. E. *See* Rulfs, C. L.
Balakina, L. N. *See* Tsvibel, V. N.
Baldi, F. *See* Signora, M.
Baldwin, W. M., jun. *See* Form, G. W.
Ball, A., wire flattening, 362
Bamal, J., low-grade coking coals for metallurgical coke, 214
Bamford, W. D., booth ventilation for swing-frame grinders, 471; dust control at foundry knock-outs, 471; dust and fumes in foundries, 471
Bancroft, D. *See* Goranson, R. W.
Banerjee, S. *See* Majumdar, A. K.
Banerjee, T., metal finishing in India, 99
Banfield, T. A., painting of ships, 108
Bannerjee, A., D. K. Sood, and **P. Mehta**, tungsten and titanium steels containing boron, 221
Banning, L. H., W. F. Hergert, and **D. E. Halter**, electric smelting of ilmenite concentrates from Idaho, 217
Bannykh, A. M., and **A. G. Neyasov**, self-fluxing sinter in blast-furnace, 469
Bapat, M. G. *See* Deshmukh, G. S.
Baracos, A., W. D. Hurst, and **R. F. Legget**, effects of physical environment on cast-iron pipe, 223
Barat, A. *See* Gélain, J.
Barbarich, M. V. *See* Kuzmin, A. D.
Barbazanges, C. *See* Boutigny, R.
Barber, R., biographical note, 349; *see also* Land, T.
Bardin, I. P., pig iron production in low-shaft furnaces, 84; semi-continuous casting of steel in Germany, 88
Bardin, I. P., and **M. Ya Ostroukhov**, processes in blast-furnace bosh, 85
Bardin, I. P., M. Ya. Ostroukhov, L. Z. Khodak, and **L. M. Tsylev**, coke circulation and combustion process in blast furnaces, 216
Bardin, I. P., A. V. Rudneva, and **L. M. Tsylov**, phase transformations in blast furnaces, 355
Bardócz, A., and **F. Varsányi**, spectrochemical analyses of steels, 110
Bardolle, J. *See* Benard, J.; Moreau, J.
Barfield, R. H., mains frequency induction heating, 225
Barker, A., and **F. W. Jones**, reversible bending of turbine shafts, 102
Barlow, T. E., and **W. J. Burke**, pressure moulding influences on pattern and rigging, 224
Barnes, R. S., surface topography of diffusion couples, 374
Barnett, Sir G., health and safety in foundry industry, 471; *see also*, Kain, C. H.
Barnett, V., *Paper*: "Positive-type Rotary Compressors," 316
Barnett, W. J. *See* Frohmberg, R. P.
Barnhardt, L. F., hydrogen control in electric-arc furnaces, 356
Barnhart, T. F., evaluation of waste pickle liquor treatment, 479
Baron, H. G., *Paper*: "Stress/Strain Curves of Some Metals and Alloys at Low Temperatures and High Rates of Strain". *Discussion*, 452. *Authors' Reply*, 455; *see also* Northcott, L.
Baron, J., creep tests on Cowper stove checkers, 84; test of failure for silica bricks, 468
Barr, H. N. *See* Shyne, J. J.
Barraclough, K. C., ingot structure, 449, 452
Barrett, G. *See* Ehlert, W. C.
Barrett, L. R. *See* Reed, L.
Bart, W. L. *See* Beams, J. W.
Bárta, R., and **K. Špičák**, tridymitic silica, 83
Bartel, R., and **A. Goldblatt**, spectrochemical analysis of alloy cast iron, 495
Barth, W., cyclone separators, 82
Bartoš, K. *See* Smrček, K.
Bartu, F., open-hearth furnace, 219
Bartu, F., and **E. Boeleus**, new profile for Siemens-Martin furnace, 355
Baš, F., forging community in Kropa, Yugoslavia, 382
Bashforth, G. R., casting-pit practice, 88
Bass, N. W., J. B. Eby, and **M. R. Campbell**, geology and mineral fuels of Colorado, 351
Bastick, M., and **H. Guérin**, specific carboxy-reactivity of coke, 353
Bastien, P., and **G. Pomey**, transformations in Fe–Cr alloys, 106, 376
Bastien, P. G., French contributions to metallurgy, 246
Bates, H., *Paper*: "The Effect of Leakage on a Sinter-plant Fan," 428; biographical note, 462
Bates, L. F., ferromagnetic domains in permanent magnet materials, 241
Bates, L. F., and **A. W. Simpson**, magnetization of high-coercivity materials, 103
Baumann, K. *See* Ruttmann, W.
Beadle, R. G., magnetic amplifier, 363
Beams, J. W., J. B. Breazeale, and **W. L. Bart**, mechanical strength of thin films, 484
Bean, E. H. *See* Cohn, E. M.
Beard, J. H., hydraulic control systems for strip handling equipment, 363
Beatty, R. L., detecting and determining CO, 245
Bechtle, R., oxygen cutting of mass-produced articles, 97
Beckham, J. W., stress analysis as casting design tool, 472
Bečvář, J., appearance of slag samples, 88
Bede, J. A., airless spray plating, 480
Bedford, T., and **B. E. Tredre**, heat stress in industry, 112
Beech, A. S., shell moulding and shell-core making, 358
Beech, E. H., reduction of dust in production of loose pattern moulds, 471
Been, U., radioactive isotopes, 247
Beganov, M. V. *See* Rozenfel'd, I. L.
Begeman, M. L., and **E. J. Funk**, seam welding dissimilar thicknesses of low-carbon steel, 232
Behrens, W. J., continuous heat-treatment for automatic production, 360
Beilhack, M., machine-tool beds, 90
Belansky, A. M., and **C. F. Peck, jun.**, roll temperature in hot strip mill, 475
Bel'chenko, G. I., and **I. M. Shapoval**, quality of hot-rolled sheet, 476
Belcher, R., D. Gibbons, and **T. S. West**, determination of S in plain carbon steel, 110
Bell, J. F., M. J. McLachlan, and **H. A. Laurie**, corrosion in marine environment, 379
Bell, R. P., and **K. A. Wheeldon**, bitumen in prevention of corrosion, 108
Bell, W. C., R. O. Dillender, H. R. Lominac, and **E. G. Manning**, vibratory compacting of metal and ceramic powders, 99
Belter, E. H. *See* Zrimsek, A. H.
Belyuchenko, I. P., mechanization of mould coating, 225
Benard, J., structure of metals and alloys revealed by oxidation reactions, 490
Benard, J., and **J. Bardolle**, oxidation of iron crystals, 490
Benda, E. K., and **R. A. Gallant**, automatic load control in fatigue tests, 483
Bendryshev, O. L., works laboratory at machine-construction works, 243
Bendure, R. J., nitric acid test for corrosion-resistant steels, 109
Bennett, A., modern forging presses, 193, 198
Bennie, R. J., corrosion problems in gas industry, 377
Benson, R., modern forging presses, 190, 200
Benua, F. F., and **P. N. Shilyaev**, electrotensometric testing of steam boilers, 368
Beránek, M. *See* Quadrat, O.
Berg, S., and **K. W. Sippell**, flame cleaning, 234
Berg, T. G. O., dissolution of Fe and Fe–Cr alloys in nitric acid, 109; dissolution of metals in nitric acid, 109
Bergenfelt, S., spectrographic solution methods for slag analysis, 217
Bergmann, W. W., decreasing scrap-charging time, 87
Berkovich, E. S. *See* Krushchov, M. M.
Berman, E. L., steelometer ST–7, 491
Bernam, E. C. *See* Wrangell, L. J.
Bernard, M., nitric acid corrosion inhibitors, 494
Bernard, R. *See* Cournot, J.
Bernstein, J., defects in cupola-melted iron, 92
Berquet, M., control in sheet finishing, 95
Berry, B. S., apparatus for measurement of internal friction of metals, 238
Berry, J. T., solidification of steel, 449
Berthe, P., submerged arc welding, 232
Berthier, P., and **C. Courty**, corrosion of tinplate cans, 493
Berthold, R., and **V. Gerold**, measuring Debye-Scherrer lines with tube counter, 243
Bertolini, I., resistance to fatigue, 240
Bessemer, Sir Henry, Centenary of, 113 (*Paper*), 118 (*Paper*), 121; centenary of Bessemer process, *between* 462–463
Bevan, J., statistical quality control, 236
Bezecný, L. *See* Teindl, J.
Bezobrazov, S. V., and **A. M. Samarin**, solubility of oxygen in Ni–Cr and Fe–Ni–Cr melts, 492
Bianchi, G., and **U. Gandolfi**, salt fog corrosion tests, 379
Bianchi, L. M. *See* Hadley, R. L.
Bickel, E., fundamental problems of machining, 97
Bieber, B. *See* Večeřa, Z.
Bien, G. S., and **E. D. Goldberg**, polarographic determination of iron in refractory materials, 109
Bietrix, M., integral grain flow forging, 94
Biggs, B. S., organic corrosion, 493
Bihet, O. L., creep strength of low-alloyed tube steels, 238
Bik, J. P. M. B., Trans-Arabian pipeline, 364
Bilby, B. A., dislocation source, 374; migration of solute atoms to dislocation arrays, 102; siliceous and titanium-bearing inclusions, 63; strain ageing, 64
Bilby, B. A., and **J. W. Christian**, martensitic transformations, 375
Billigmann, J., action of rolling lubricants, 95
Billings, A. S., inspection methods at Ryan Aeronautical Co., 242
Binder, F., and **E. Macherauch**, directions of zero strain in unstressed state, 242
Binnie, D., obituary, 349
Birchall, T., welded blast furnace, 354
Biren, J., and **P. Wagener**, creep of Cr–Mo steels, 240
Birkhead, M., hardfacing, 232
Biryukova, V. N. *See* Astrov, E. I.
Bishop, E., hot-work tool steels, 357
Bishop, H. F. *See* Myskowski, E. T.; Sandoz, G. A.
Bishop, H. F., E. T. Myskowski, and **W. S. Pellini**, determining riser dimensions, 225

Bishop, T., Comet inquiry, 487; surface hardening of crankshafts, 361
Blackman, P. D. *See* Parker, C. J.
Blaine, L. R. *See* Plyler, E. K.
Blanc, G., and **N. Volianik,** effects of gases on structure of cast iron, 472
Blechar, T. *See* Goranson, R. W.
Block-Bolten, A., S in binary liquid solutions, 496
Blois, M. S., jun., thin magnetic films, 103
Bloom, F. S., combustion systems in steel plants, 81
Blount, E. A., conveyorized shell finishing, 98
Blücher, F., coal, iron, and steel in German industry, 111
Bluhm, J. I., stresses in projectiles during penetration, 484
Blumhof, Johann Georg Ludolph, encyclopaedia of metallurgy, 382
Boas, N., corrosion in petroleum distribution plants, 378
Boas, W., stored energy and lattice defects, 374
Bobtelsky, M., and **E. Jungreis,** copper salicylaldoxime in microdetermination of Cu, 244
Bockshammer, H. *See* Wittmoser, A.
Bodamer, G. W. *See* Horner, C.
Bodnevas, A. I. *See* Matulis, Yu. Yu.
Boeckhaus, K., and **H. Ehrenberg,** single- and multi-jet torches for hot forming, 475
Boeckhaus, K., and **W. Lenk,** material and flamecutting, 96
Boelens, E. *See* Bartu, F.
Boening, E. F., and **J. Kostelac,** electrical control for processing of transformer core steel, 230
Bogachev, A. M., B. I. Verkhovskiĭ, and **A. H. Makarov,** thickness measurement with radioactive radiation, 371; thickness measurement of rolled steel products, 371
Bogachev, F. A. *See* Smirnov, A. V.
Bogar, R. S., hydraulic systems on charging machines and manipulators, 231; preventive crane maintenance, 96
Bogatskii, D. P., and **G. G. Urazov,** low-grade complex iron ores, 351
Bogdandy, L. v., cropping of ingots for wheel rims, 357
Bogdanov, S. G., hot and cold ductility of Al coatings, 366
Bogoraz, B. A., mould life, 472
Bogoyavlenskaya, N. V., and **G. N. Bogrets,** electrolytic polishing of stainless-steel tubes, 98
Bogrets, G. N. *See* Bogoyavlenskaya, N.V.
Bohr, H., prediction in steel industry economics, 496
Boiko, S. G. *See* Arsenishvilil, A. Yu.
Boikova, A. I. *See* Toropov, N. A.
Boklen, R., flat cylindrical indentation test and stress-strain curve, 488
Bokshitskiĭ, Ya. M., calculating steel-melting arc furnaces, 220; quality of ball-bearing steel, 356
Bokshtein, S. Z., T. I. Gudkova, S. T. Kishkin and **L. M. Moroz,** homogeneity of alloys, 243
Bolognesi, G., corrosion testing, 379
Bolotov, I. E., and **M. I. Gol'dshtein,** redistribution of Cr during diffusional annealing, 372
Bond, R. L., and **A. R. Murnaghan,** surface diffusion, 383
Boned, J. A., M. Serra, and **S. Feliu,** anomalies in electrolytic polishing, 479
Boni, R. E., and **G. Derge,** surface structure of nonoxidizing slags containing S, 217; surface tensions of silicates, 86
Boomsma, M., fatigue strength of bolted joints, 369
Boon, J. W., electrochemical corrosion of metals, 493
Bordes, A., chill and wedge tests, 471
Boring, R. *See* Goetchens, P.
Borione, R., impact strength and brittle fracture, 238; *see also* Colnel
Borisov, V. T. *See* Golikov, V. M.
Bornatskii, I. I. *See* Kulikov, V. O.
Borodin, V. P., V. F. Demenkov, P. È. Darmanyan, and **A. A. Yudson,** automatic regulation of thermal conditions in oil-fired O.H. furnace, 470
Bortunov, E. M. *See* Chekmarev, A. P.; Molotkov, L. F.
Bostock, W. *See* Lakey, J. R. A.
Bouffart, M., Saint-Michel blast furnace, 496
Boulanger, C.-J., iron purification, 489
Bounds, A. M. *See* Hoff, R. L.
Boustred, W. G., jun., corrosion-resisting steel castings, 222
Boutigny, R., and **C. Barbazanges,** feeding O.H. furnaces with low-carbon iron produced from scrap, 219
Bowden, E. P., and **E. H. Freitag,** experiments in friction, 241
Box, F. W. *See* Bush, G. H.
Boxall, T. D. *See* Hundy, B. B.
Boyd, G. M., alloy steels, 457; metals at low temperatures, 454
Boyer, A. F. *See* Loison, R.
Boyer, H. E., hardenability, 489; identification of steels, 110; steel microstructures, 489
Boyer, R., spares for steel plant, 231
Boyet, H. *See* Weisbaum, S.
Bracale, S. *See* Massimilla, L.
Bradlee, C. R. design of cold extrusion dies, 229
Bradley, D. E., progressive etching effects on pearlitic steel, 107
Bradstreet, B. J., metal-arc welding, 97; *see also* Cottrell, C. L. M.
Bragg, Sir, L., models of metal structure, 374
Bragin, V. T., influence of CO on dehydration of iron ores, 81
Braicovich, L., and **M. F. Landi,** potentiometric determination of Mn, 110
Bramley, L. N., modern forging presses, 192, 201
Brandt, D. J. O., oil in open-hearth steelmaking, 51
Braumann, F. *See* Buchholtz, H.
Braun, A., Vickers hardness and load, 103
Breazeale, J. B. *See* Beams, J. W.
Bredzs, N., and **D. Canonico,** lithium additions to brazing alloys, 232
Bremer, E., centrifugal casting, 358; small steel foundry, 359
Brenner, P., light metals *v.* steel, 111
Breuer, W., tests with Cr-Mn case-hardening steels, 238
Brewster, F. S. *See* Dietert, H. W.
Briefs, H., low-alloy heat-treatable steels, 104
Briggs, C. W., risering of commercial steel castings, 225
Briggs, J. Z., alloys for chemical process industries, 357
Briggs, P. R. A., instruments for rolling mills, 231
Briggs, P. R. A., and **W. H. Bailey,** measurement of strip tension, 476
Brinckerhoff, J. E., insulating firebricks 83
Brisby, M. D. J., modern forging presses, 194
Britton, S. C., and **D. G. Michael,** rust resistance of tinned steel in alkaline solutions, 109
Broadbent, W. D., transport in wire industry, 362
Brocke, F., operation of wet cleaning plant, 479
Brooks, H., lattice vacancies and interstitials, 373
Brooks, J. D., organic sulphur in coal, 82
Brosch, C. Dias, 'wet clays' used in foundry sands, 90
Broszko, M., buckling, 368
Brouillet, P., I. Epelborn and **M. Froment,** valency of metallic ions, 234
Brower, M. A., smog control, 231
Brown, D. W., work coils for induction heating, 227
Brown, J. R., solubility of carbon and nitrogen, 54
Brown, L. J., S. Spring, and **W. J. Hennessey,** pinpoint corrosion, 97
Browning, E. H., electrical drive systems for modern rolling mills, 230
Browning, G. F. *See* Simons, E. L.
Brož, J., magnetic properties of pure iron, 486
Bruce-Gardner, Sir C., furnace scanning periscope, 48
Bruch, J. *See* Möhl, K.
Brugger, J., gaseous carburization of driving-gears, 226
Brühl, F., steel quality and standardization, 111
Bruins, A. W., enamelling, 234
Bruk, A. S., and **Z. A. Volkova,** properties of fractions of metallurgical coke, 353
Brüker, W. *See* Heinrichs, W.
Brulhet, P. J., power generation with gas engines, 82
Bruma, M., spark machining, 97
Bruma, M., and **J. Roncin,** electro-erosion effect, 478
Brune, F. G., maintenance operations in production plating, 99
Brush, E. G. *See* Koenig, R. F.
Bryant, M. C., strippable stop-off coatings 480
Bryant, W. C. *See* Magie, W. A.
Bryce, J. T. *See* Rote, F. B.
Buchholtz, H., F. Braumann, and **A. Eier,** twin crystals of deformation and fracture of α-iron, 374
Bückle, H., microhardness and solid-state reactions, 486
Bucklin, A. G. *See* Grant, N. J.
Buehl, R. C., and **M. B. Royer,** smelting iron ore with anthracite, 85
Bueltman, C., and **A. B. Mindler,** rinse water re-use by ion exchange, 365
Buhl, E. *See* Lihl, F.
Bühler, H., residual stresses and plastic deformation, 483; residual stresses after surface hardening, 473
Bühler, H., and **H. Hendus,** determination of internal stresses in water-quenched steel cylinders, 368
Bulakh, N. I., bend-testing of grey iron specimens, 238
Bulat, T. J., metal cleaning efficiency, 98
Bullough, W., closed cycle sulphuric acid pickling system, 479
Bul'skii, M. G. *See* Osipov, A. I.
Bulskii, M. T. *See* Osipov, A. I.
Bungardt, K., high quality heat-resistant materials, 104
Bungardt, K., G. Hoch, and **O. Mülders,** strength and notch toughness of hot-working tool steels, 101
Bungardt, K., K. Kind, and **W. Oelsen,** solubility of vanadium carbide in austenite, 492
Bungardt, K., and **E. Kunze,** boron in case-hardening and strengthened steels, 242
Bünger, J., photometric determination of Mo in steel, 245; potentiometric determination of V in high-Cr steels, 244
Bungeroth, A. *See* Speith, K. G.
Buravlev, M., spectrographic analysis, 491
Buravlev, Yu. M., spectrographic analysis of steels, 491
Burdese, researches on Fe–N system, 106
Burdese, A. *See* Cirilli, V.
Burduksii, V. V., stress-relaxation criteria, 239
Burger, G. *See* Fink, K.
Burke, W. J. *See* Barlow, T. E.
Burleigh, T. E., jun., and **W. C. Frye,** rotary gas ballast pumps, 359
Burnett, G. E., and **P. W. Lewis,** tests of coatings and wrappings, 98
Burns, C., *Paper:* "A Furnace Scanning Periscope." *Discussion,* 47; furnace scanning periscope, 355
Burrill, E. A., portable X-ray generator, 371
Burstlein, E., coking coals, 352
Burton, B. L. *See* Goranson, R. W.
Burton, H. H., ingot cooling, 446; ingot structure, 451, 452
Burton, J. A., semi-conductors, 373

Bush, G. H., D. G. Higgs, and **F. W. Box,** analysis of phosphating preparations, 480
Bussey, J., obituary, 78
Buswell, D. P. *See* Hense, V. E.
Buswell, R. W. A., fabrication of air-cooled turbine blades by powder metallurgy, 481
Butler, G. *See* Wormwell, F.
Buyanov, N. V., spectrographic analysis of carbon- and low-alloy steels and pig iron, 495; spectrographic analysis of slags, 381
Byars, H. G. *See* Greenwell, H. E.
Bystram, M. C. T., stainless alloy metallurgy, 97

C, G. Abele. *See* Johnson, R. F.
Čadek, J., effect of tungsten on isothermal decomposition of austenite in 25 MnCrV steel, 106
Cadilhac, A., special steels in automobile industry, 495
Cahn, R. W., grain boundaries, 373
Cain, Tubal, artificer in metals, 246
Caine, J. B., magnetic particle inspection standards, 486; ruptures in steel castings, 90; steel castings *v.* forgings, 357
Caldwell, V., wear minimization, 370
Callaway, J., electronic energy bands in iron, 370
Callis, G. T., mechanism of erosion damage, 493
Calmes, C., gas-fired pusher furnaces, 93
Calmettes, J., and **R. Ferry,** hydrogen in steel, 238
Calnan, E. A., and **B. E. Williams,** slip-band extrusion, 372
Cameron, J. M., and **A. J. Baeslack,** inert gas-welding of mild steel, 477
Camino, M. Puebla, large forgings, 474
Campbell, M. R. *See* Bass, N. W.
Campbell, R. H., Scottish pig iron trade 1844–1848, 496
Caney, R. J. T., and **B. Henshall,** corrosion in chemical industry, 378
Canonico, D. *See* Bredzs, N.
Carius, C., passivation of chrome steels, 365
Carlisle, S. S., coated steel sheet, 235
Carlisle, S. S., and **G. W. Alderton,** instrumentation of 14-in. experimental rolling mill, 229
Carlson, J. F. *See* Thomas, J. M.
Carmen, E. H., iron powder magnets, 100
Carn, W. F. *See* Lamb, W. W.
Carney, A. L. *See* Lowen, J.
Carney, D. J., high nitrogen steels, 242
Carr, F. L. *See* Ham, J. L.
Carr-Harris, G. G. M., isotopes and metal engineering, 246
Carrancio de la Plaza, H., and **A. Camuñas Puig,** spectrographic analysis of steels, 495
Carter, P. T., oil in open-hearth steelmaking, 52
Carter, S. F., chromium reactions in acid and basic furnaces, 355
Cartledge, G. H., electrochemistry of stainless steel in sulphuric acid, 244
Cartwright, P. A., corrosion and meteorology, 493
Cartwright, W. F., iron and steel, 216; Russian iron and steel industry, 216
Cass, W. G., working spheroidal graphite iron in Russia, 89
Caulfield, T. H., defects in cupola-melted iron, 92
Cavanagh, W. R., and **R. C. Gibson,** phosphate coating of metal surfaces, 480
Cawley, F. B. *See* Leroy, P. J.
Cawley, F. B., and **D. R. Wattleworth,** *Paper*: "The History and Practice of the Acid Bessemer Steelmaking Process in West Cumberland." *Discussion*, 438. *Correspondence*, 441. *Authors' Reply*, 442
Cazaud, R., fatigue resistance of machine parts, 240; physical properties of low- and high-nickel steels, 104
Cech, R. E., and **D. Turnbull,** heterogeneous nucleation of martensite transformation, 377
Čechura, F., loss of iron in slag in O.H. process, 219
Cederquist, K. N., pastes for Söderberg arc-furnace electrodes, 217
Cellan-Jones, G., blending coke and smokeless fuel, 353
Čermák, M., X-ray measurements of internal stress 240
Černoch, S., blast furnaces with thin-walled shafts, 84; standardization of open-hearth furnace dimensions, 355
Cewrien, G. A., rail-less materials handling, 232
Chalmers, B., crystal growth, 373
Chambers, B., descaling titanium and stainless steel, 233
Chappie, H., affect linear shrinkage, 472; zircon sand for large castings, 224
Chard, E. A., biographical note, 78
Charlton, E. E., high voltage sources for industrial radiography, 487
Charpy, Georges, work of, 239
Charrin, V., dolomite: uses and deposits in France, 467
Charron, F., lubrication under rapidly varying pressure, 477
Charvát, V., influence of grinding on coke quality, 352; *see also* Havel, O.
Chase, H., continuous stamping and welding line, 228
Chaston, J. C., high-purity metals, 383
Chatet, L., hot blast valves, 84
Chaudron, C., composition of ferrous oxide, 107
Chavanne, R., basic Bessemer steel for railway rails, 111
Chawner, P. M. H., electrolytic polishing, 490
Check, M. M., powder metallurgy *v.* other precision forming methods, 100
Cheetham, G., rare earths in steelmaking, 87
Chekmarev, A. P., V. L. Pavlov, V. M. Klimenko, G. E. Tsukano, E. M. Bortunov, and **P. A. Vashchilo,** rolling conditions in type 1150 blooming mill, 475
Chelyshev, N. A., working conditions of medium-sheet mill, 229
Cherkov, D. A., viscosity of blast-furnace slags and minerals, 469
Chernenko, M. A., design of O.H. furnaces, 218
Chernevich, E. M. *See* Molotkov, L. F.
Chernikhov, Yu. A., B. M. Dobkina, and **L. M. Khersonskaya,** complexometric determination of Al in silicates and slags, 492
Chernobrovkin, V. P., linear contraction, 472
Chernov, N. N., gas-stream distribution in blast furnace, 84
Chernov, N. N., I. F. Domnitskii, and **G. S. Manchenko,** changes in static pressure along height of blast furnace, 355
Chertok, M. M., X-ray detection of residual austenite in hardened steel, 487
Chervonnyi, S. A. *See* Tyurin, A. I.
Chesnut, F., vacuum melting furnaces, 359
Chesters, J. H. *See* Pearson, S. W.
Chiba, S., magnetic properties and phase diagram of Fe–Te system, 106
Chikazumi, S., and **T. Oomura,** magnetic anisotropy, 103
Childs, W. J., and **J. B. Hyman,** thermal studies in shell moulding, 472
Chilver, A. H., instability of testing machines, 100
Chion, R., radiation pyrometers, 82
Chipman, J. *See* Cordier, J. A.
Chojnowski, E. F. *See* Rote, F. B.
Chouvel, R., and **J. Seloron,** continuous casting of alloy steels, 88
Christian, J. W. *See* Bilby, B. A.
Christoph, H., accuracy and tolerance in flame cutting, 233
Christopher, C. F., high-temperature impact properties of cast steel, 90
Chufarov, G. I., M. G. Zhuravleva, E. P. Tatievskaya, B. D. Averbukh, and **V. K. Antonov,** hot tinning problems, 366
Ciffo, C., sulphurizing or sulphur cementation, 226
Cina, B., delta-ferrite, 58
Cirilli, V., and **A. Burdese,** calcium oxide-wüstite system, 377
Cizeron, G., and **P. Lacombe,** heating of carbonyl iron under isothermal conditions, 376
Clark, A. M., atmospheric gases, 469
Clark, H. E. *See* Vyverberg, R. G.
Clark, L. J., steam and power in gasworks, 82
Clark, L. L., hot tears in steel castings, 358
Clarke, E. C., stresscoat, 484
Classen, F. *See* Delsa, A.
Clauss, A. *See* Forestier, H.
Claussen, J. E. *See* Wilson, J. L.
Clayton, G. D., air pollution, 111
Clayton-Cave, J. *See* Ineson, E.
Cleary, W. A., shell moulding, 357
Clees, H., conversion of cold gas furnaces to oil firing, 353
Clewes, H. W., process control in vitreous enamelling, 98
Cline, C. W., and **J. B. Morgan,** standardization in ultrasonic testing, 370
Coates, C., tensile strength in steel wire manufacture, 238
Cocciolo, L. *See* Dainelli, L.
Cochardt, A. W., G. Schoek, and **H. Wiedersich,** interaction between dislocations and interstitial atoms, 482
Coche, L., D. Dastillon, M. Deudon, and **P. Emery,** Lorraine iron-ore basin, 80
Cohen, J., E. Hall, L. Leonard, and **R. Ogilvie,** segregation in cast irons, 372
Cohen, M. *See* Kaufman, L.
Cohen de Lara, G. *See* Husson, F.
Coheur, P., basic Bessemer conversion process, 218; international collaboration in iron and steel research, 216
Coheur, P., and **H. Kosmider,** basic Bessemer steel processing, 86
Cohn, C. C., finishing and plating of metal powder parts, 481
Cohn, E. M., E. H. Bean, M. Menster, L. J. E. Hofer, A. Pontello, W. C. Peebles, and **K. H. Jack,** carburization of iron oxide with carbon monoxide, 109
Cola, G., study of grey iron castings, 222; testing of grey iron castings, 222
Cole, E. S., steel pipe with cement coating and lining, 236
Collari, N., steels for superheater tubes, 381
Collaud, A., structural anisotropy of grey castings, 89
Collins, B. G. *See* Dick, J. B.
Collins, L. N., Tata Iron and Steel Co., Ltd., 86
Colnel, Palme, and **R. Borione,** French Thomas steel rail, 111
Colombier, L., temper brittleness, 370
Colwell, A. T., blades, buckets, and vanes for turbine engines, 496
Comley, A. W. F., and **T. E. Such,** hard chromium plating of tool steels, 365
Conard, G. P. *See* Griest, A. J.; Hall, R. C.
Conley, J. E. *See* Heindl, R. A.
Constant, A., and **C. Delbart,** creep-resisting alloy, 485
Conway, M. J., insulating enamel, 480
Cook, N. E., continuous hot galvanizing of strip, 235
Cook, N. H. *See* Loewen, E. G.
Cook, P. M., modern forging presses, 194
Cook, P. M., and **J. D. Stringer,** *Paper*: "Increased Heating Rates for Steel Ingots," 309
Cope, S. R., drawing dies for stainless steels, 475
Corbière, R., electrodeposition in Belgium since 1945, 99
Cordero, H. G., visit to Poland, 468
Cordier, J. A., and **J. Chipman,** sulphur in liquid Fe–Ni alloys, 87
Corey, C. L. *See* Freeman, J. W.

Cornet, I., and **R. C. Grassi,** fracture of inoculated iron, 89
Corney, N. S., and **E. T. Turkdogan,** *Paper:* " Effect of Alloying Elements on the Solubility of Nitrogen in Iron: Part I." *Discussion,* 52. *Correspondence,* 55. *Authors' Reply,* 56
Cornuat, M., Sidelor-Micheville coke oven plant at Villerupt, 214
Coron, P., tyre forging, 474
Corsini, M., production of metal powders, 366
Cotton, L. G., jun., effect of ferrochromium on stainless melting practice, 357
Cottrell, A. H., creep and ageing in solid solutions, 485
Cottrell, C. L. M., B. J. Bradstreet, and **T. E. M. Jones,** weldability of Mn–Ni–Cr–Mo steels, 96
Couka, R., preparation of frits and granules, 366; raw materials for enamelling sheet iron and steel, 366
Cournot, J., M. Van den Bosch, M. Eudier, R. Girschig, and **R. Bernard,** powder metallurgy, 99
Courtheoux, mill trains for heavy sections, 475
Courty, C. *See* Berthier, P.
Covre, G., evolution of structural steel work, 495
Cox, A. B., and **E. C. Kuster,** corrosion inhibitors, 378
Cox, G. L. *See* Ernst, C. E.
Cox, W. F. *See* Nemet, A.
Cracknell, A., and **N. J. Petch,** hydrogen and yield point in steel, 102
Craig, A. M., industrial lubricating oils, 232
Cramer, R. E., and **R. S. Jensen,** railroad rails and joint bars, 372
Cremer, G. D. *See* Long, J. V.
Crépal, H., enamelling of cast iron, 366
Crites, C. J., vacuum melting, 359
Crosby, V. A. *See* Archer, R. S.
Cross, H. C. *See* Simmons, W. F.
Crossett, J. W. *See* Armstrong, T. N.
Crussard, C., explosion waves and growth of martensite, 105; martensitic transformation of metals, 104
Crussard, C., and **J. Friedel,** accelerated creep and rupture, 485
Csanady, G. T., dispersal of dust particles from elevated sources, 354
Cullen, O. E., furnace atmospheres for carbon control, 226; mechanized heat treating, 93
Curnick, H. R. *See* Walker, C. D. H.
Curson, G. A., plastic coatings for corrosion prevention, 236
Cuscoleca, O., and **K. Rösner,** oxygen steel melting process, 218
Cuthbertson, J. W., electrolytic surface conditioning, 234
Cuthill, J. R. *See* Moore, D. G.
Cuvillier, J. *See* Detrez, P.
Cyaplicki, L. *See* Herbiet, H.
Cyther, J. *See* Remond, V.
Czerlinsky, E., properties of commercial dyanmo plates, 496
Czyzewski, M., C. Podrzucki, and **Z. Wittek,** cupola melting, 89

Daane, R. A. *See* Leeser, D. O.
da Fonseca Costa, E. L., seamless tube mill in Brazil, 383
D'Agostino, J., D. C. Drucker, C. K. Liu, and **C. Mylonas,** plastic behaviour of metals, 482
Dahl, W., W. Jellinghaus, and **E. Houdremont,** transformation of manganese steels, 376
Dahlgren, S. E. *See* Lindblom, Y.
Dahlke, O., and **O. Knacke,** solution of carbon in liquid iron, 372
Dahlmann, A. *See* Heinrichs, W.
Dainelli, L., and **L. Cocciolo,** influence of work hardening on steel strip, 241
Dally, J. A., and **A. J. Durelli,** prediction of brittle coating strain sensitivity, 484
Dalton, R. F., rubber-lined core boxes, 91
Damper, J. D., intercommunication in iron and steel industry, 231
Dana, A. W., jun., F. J. Shortsleeve, and **A. R. Troiano,** flake formation in steel, 102
Danilin, V. I. *See* Efimov, V. A.
Danilovskaya, V. I., G. M. Ivanova, and **Yu N. Rabotnov,** creep and relaxation of Cr–Mo steel, 485
Danis, F., cold blast cupola, 472
Danis, F., and **P. Détrez,** cupola operating costs, 472
Danishevskii, S. K., tungsten–molybdenum thermo-couples, 467
Danko, J. C., and **R. D. Stout,** morphology of fracture, 239
Dannatt, P. C., electrical equipment of four-stand strip mill, 230
Darling, C. S., corrosion in boiler plants, 380
Darmanyan, P. È. *See* Borodin, V. P.
Dashevskii, Ya. V., A. E. Runov, I. S. Kazak, D. D. Zheltov, and **B. A. Mel'nik,** casting silicon ferro-alloys, 88
da Silveira Feijo, A. H., examination of boiler tubes, 368; examination of steel cable, 368; examination of steel crankshaft, 368
Dastillon, D. *See* Coche, L.
Daubert, A., construction of steel undercarriage parts, 111
Dauvergne, J., exploitation of natural gas deposits, 108
Davenport, L. H. *See* Young, R. T.
Davidson, S. M., electrical inspection of steel pipe coatings, 236
Davidsson, W., tensile strength in wire ropes with broken wires, 238
Davies, A. S., Isaac Wilkinson of Bersham, 382
Davies, J., monolithic converter linings, 217
Davis, G. L., and **C. H. R. Gentry,** electrodeposition of tungsten, 236
Dawkins, A. E., chromic acid-acetic anhydride ' explosion ', 97
Dean, S. K., and **M. A. Kilburn,** simple torquemeter, 96
Decalf, H., incorporation of fuel oil in metallurgical coke blend, 214
Decamps, G., Bessemer converters, 218
Dechaux, G., protective painting of structural steel, 99
Decker, A., and **R. Sevren,** hydrogen in liquid basic Bessemer steels, 218
de Coriolis, E. G., automation in heat-treatment, 360
Decrop, M., cupola coke, 353
Defize, L. F. *See* van der Willigen, P. C.
de Fleury, R., properties of grey cast irons, 482
de Gelis, P. *See* Lamure, J.
Degler, H. E., cooling towers for steel plants, 231
de Hedouville, J. *See* Gombert, M.
Dehlinger, U., H. Schenk, and **W. Weser,** bonding conditions in metallic phases, 243
De Jong, A., blasting and shaking of metal surfaces, 234
Děkanovsky, A., economics of four steel-making processes, 217
de Kazinczy, F., hydrogen occlusion and equilibrium hydrogen pressure in steel during electrolytic charging, 102
de Kerversan, E. *See* Pignet, J.
Dekeyser, W., crystal growth and lattice defects, 374
de la Motte, A. *See* Habraken, L.
De Lanal, C. G., metal temperature and iron melting reverberatory furnace, 223
Delbart, C. *See* Constant, A.
Delbart, G. *See* Kohn, A.
Delcroix, J., extruding metal with glass lubricants, 229; extrusion, 475
Delong, P., application of granulometric index to study of mixer-grinder, 82
Delsa, A., M. Nepper, F. Classen, and **J. Nils,** basic Bessemer rimming steel ingots, 221
Deltombe, E., and **M. Pourbaix,** equilibrium–potential/pH diagrams, 380
Demarteau, behaviour in blowing of different types of bottoms, 355
Demarteau, M., alumino-silicate refractory products, 83
Demenkov, V. F. *See* Borodin, V. P.
Dement'ev, Kh. N., R-5 testing machine, 367
Demicheli, W., ultrasonic non-destructive testing, 241
de Miscault, J., coke-ovens of iron-smelting industry in Lorraine, 214
Dem'yanchuk, A. S. *See* Kudelya, E. S.
Denck, W., and **C. Mahr,** nephelometric determination of Cu, 245
Denholm, W. T., passive behaviour of iron, 378
Denis, N. *See* Galey, J.
Déportes, C. *See* Dodero, M.
Derge, G. *See* Boni, R. E.
Derge, G., and **W. O. Philbrook,** desulphurization in slag-metal systems, 355
Deruelle, J., Carling process for production of coke from Lorraine coals, 215
Deschamps, Y., precision casting, 358
Deshmukh, G. S., and **M. G. Bapat,** bromometric determination of vanadium^{V} by hydrazine, 245
Desoer, A., F. Vandestrick, and **J. Wurth,** cold working properties of basic Bessemer steel, 86
Dessauer, K. H. *See* Vyverberg, R. G.
de Sterke, A., continuous and impulse wave testing of materials, 241
de Surmont, G., jun., control of frits and tests of enamel quality, 366
Détrez, P. *See* Danis, F.
Detrez, P., and **J. Cuvillier,** cracking of iron castings, 472
Deudon, M., Lorraine ironstones, 80; *see also* Coche, L.
Devernay, E. *See* Leroy, P.
Dewez, F. J., jun., *See* Fairbanks, H. V.
de Wildt, J. F., plants at Ijmuiden, 468
Dey, B. B. *See* Ray, S. K.
Diamond, G. X., metal working in Colombia, 111
Dick, J. B., and **B. G. Collins,** general ventilation of small foundries, 471
Dickason, A., sheet metal work, 381
Dicke, R., and **H. Schiffers,** hardenability investigations in cast iron, 92
Dickerson, P. D. *See* Jones, H. G.
Dickerson, R. F. *See* Saller, H. A.
Dickinson, T. A., electroless plating, 480; subzero treatments for metals, 473
Dickmann, H., Johann Georg Ludolph Blumhof and encyclopaedia, 382
Dietert, H. W., F. S. Brewster, and **A. L. Graham,** load-carrying power of moulding sands, 224
Dietz, J., and **L. H. McCreery,** fabricating ultra-high strength steel, 474; high-strength steel, 111
Dill, G. D., abrasive scale-blasting, 233
Dillender, R. O. *See* Bell, W. C.
Dillon, J. A. *See* Eberle, F.
Dines, G. J., order-disorder transformations, 376
di Sambuy, V., shell moulding, 358
Dixon-Lewis, G., internal structure of flame reaction zones, 352
Djatshenko, P. V., and **T. W. Smushkova,** residual stresses in surface layer of metals, 488
Doane, D. V. *See* Scholze, W. G.
Doat, E., thin cast irons for enamelling, 366
Dobbins, N. E. *See* Walker, C. D. H.
Dobkina, B. M. *See* Chernikhov, Yu. A.
Dodd, R. A., hot tearing of castings, 359
Dodero, M., and **C. Déportes,** alkali ferrites, nickelites, and cobaltites, 481
Dolan, T. J. *See* Work, C. E.
Dolmatov, E. M, and **M. I. Yarovoi,** mechanization of old-type rolling mill, 95
Domagala, R. F., and **D. J. McPherson,** induction and resistance furnaces, 359
Domnitskii, I. F. *See* Chernov, N. N.

Dor, L., statistical techniques in iron and steel making, 112
Dorigo, O., electric sintering furnaces, 481
Dorn, J. E., high-temperature creep, 485; *see also* Sherby, O. D.
Dorner, H. *See* Samuel, R. L.
Doss, J., quality tests for black oxide coatings on steel, 366; *see also* Gilbert, L. O.
Douyère, G., role of foreman in enamelling, 366
Dover, J. D., micro-hardness testing machine, 103
Dow, R. E., corrosion in oil fired boilers, 378
Dowding, M. F., mill practice and design, 363
Drennan, J. E. *See* Todd, F. C.
Drozdovskii, B. A., and **Ya. B. Fridman**, sensitivity of materials to cracks, 238
Drucker, D. C. *See* D'Agostino, J.
Drutskaya, L. B., spectrographic analysis of alumina, 381
Dubinin, G. N., pack chromizing of steel, 365
Dubrov, N. F., V. A. Selivanova, and **T. S. Konovalova**, transformer steel alloyed with Al, 221
Duchemin, E. P. *See* Wallace, J. R.
Duffy, L. *See* Potter, F. J.
Duflot, J., ingot cooling, 446; shape of ingots, 220
Dufour, J., enamelling of sheet iron and steel, 366
Dugdale, R. A., irradiation effects in crystalline solids, 374
Dugi, Z. *See* Markovic, T.
Dulis, E. J., S. J. Parker, and **P. W. Marshall**, properties of stainless steels, 242
Dunbar, A. F., and **H. A. Stephens**, mechanism of corrosion, 377
Duncan, B. J., and **L. Swern**, ferrimagnetic resonance in ferrites, 481
Dunn, C. G., and **W. R. Hibbard, jun.**, polygonized Si-Fe crystals, 107
Dunn, J., stray current electrolysis in Victoria, 378
Dunning, E. R., foundry cleaning, 471
Durand, C. *See* Scortecci, A.
Durand, R. *See* Husson, F.
Durelli, A. J. *See* Dally, J. A.
Durelli, A. J., R. H. Jacobson, and **S. Okubo**, properties of stresscoat, 484
Durelli, A. J., S. Okubo, and **R. H. Jacobson**, properties of stresscoat, 484
Dvornichenko, A. S., transverse deformations, 483
D'Yachenko, P. E., and **T. V. Smuchkova**, residual stresses in metal, 239
D'yachkov, P. N. *See* Gomel'skii, K. Z.
Dyngvold, F., electrodeposited metals, 234

Earley, C. C. *See* Allen, N. P.
Eaton, R. H. *See* Schwartz, F. L.
Eberle, F., F. G. Ely, and **J. A. Dillon**, experimental superheater for steam 242
Eborall, R., intercrystalline fracture, 485
Eby, J. B. *See* Bass, N. W.
Echeverria, G. Arregui, Spanish metallurgical problems, 217
Eckhart, O., bentonite testing, 90
Eddy, W. H. *See* Gayle, J. B.
Eder, A., photometric determination of Nb and Ta in steel, 381
Eder, F. X., entropy and strain hardening, 483
Edmonds, C. *See* Atterton, D. V.
Edneral, F. P., nitrogen content of arc furnace baths, 470; production of electric steel by Duplex process, 220
Edwards, C. A., *Paper*: "The Relative Merits of Low- and High-Sulphur Oil for Open-Hearth Steelmaking." *Discussion*, 48. *Correspondence*, 51. *Authors' Reply*, 52
Edwards, J. A., coated engine valves, 366
Efimov, V. A., V. I. Danilin, and **M. P. Lapshova**, effect of crystallization on ingot defects, 357
Egorov, E. I., vacuum-heating determination of hydrogen in iron, 244
Ehlert, W. C., G. Kaufman, and **G. Barrett**, liquid honing, 479
Ehrenberg, H. *See* Boeckhaus, K.
Eichberger, L. C. *See* Steele, M. C.
Eier, A. *See* Buchholtz, H.
Eisermann, F., turbo rotors and blades, 381
Eisler, S. L. *See* Gilbert, L. O.
Eitel, W., and **N. Köppen**, cement-sand steel casting methods, 224
Elbaum, C., cystal growth and lattice imperfections, 374
Elizarov, N. G., reversers for tensile machine, 237
Elkan, R. M. L., and **J. T. Lewis**, *Paper*: "Modern Forging Presses and their Control." *Discussion*, 188. *Correspondence*, 205. *Authors' Reply*, 195, 203, 207
Elliott, C., and **J. W. Robinson**, titrimetric determination of Al in steel, 245
El'tsin, Yu. V. *See* Zamyatnin, M. M.
Ely, F. G. *See* Eberle, F.
Elyutin, V. P., and **A. K. Natanson**, mixing metallic powder with aid of tracer atoms, 100
Emery, L. E., refractory cost in malleable melting, 83
Emery, P., treatment of iron ore in U.S.A., 351; *see also*, Coche, L.
Emms, S. A. G., and **G. F. J. Morgan**, electrical equipment of temper mills, 230
Endo, H., N. Ohtani, and **S. Shimodaira**, corrosion of metals in alkaline solutions, 244
Endoh, M., and **K. Nisino**, isothermal transformation, 490
Engel, A. L., H. J. Heinen, E. Morrice, and **E. S. Shedd**, concentration tests on manganese ores, 81
Engel, A. L., E. S. Shedd, and **E. Morrice**, concentration tests of chromite ores, 81
Engell, H.-J., corrosion of α-iron crystals in diluted acids, 108
Enghag, P., analysis in steelworks laboratories, 110
Entin, R. I. *See* Kogan, L. I.
Enzian, G. H., brittle failures in steel, 486
Epelboin, I., mechanism of electrolysis, 380; *see also* Brouillet, P.
Erd, R. C., and **H. T. Evans, jun.**, Smythite, 496
Ergun, S., flow experiments on gasification reactions, 353
Ericson, S.-E., arc welding of steels for water turbine rotors, 232
Ermolov, I. N., and **E. Kh. Ripp**, shear modulus, 239
Ernst, C. E., R. V. Adair, and **G. L. Cox**, flame-hardened ductile irons, 361
Erokhin, A. A., temperature of droplets of molten electrode metal during arc welding, 232
Esch, H. *See* Schenck, H.
Esin, O. A. *See* Popel, S. I.
Esin, O. A., and **A. K. Kir'yanov**, transfer numbers of calcium ions in molten slags, 217
Esin, O. A., and **B. M. Lipinskikh**, properties of individual components of molten slag, 220
Esin, O. A., and **V. N. Shikhov**, dephosphorization of liquid iron with slag, 470; desulphurization of molten iron with slag, 220
Ess, T. J., Jones and Laughlin Aliquippa Works, 354
Essenhigh, R. H., combustion of carbon, 467
Estes, P. H., electrical steels, 220
Estulin, G. V. *See* Pridantsev, M. V.
Eubanks, A. G., and **D. G. Moore**, adherence of vitreous coatings to iron, 98–99
Eudier, M. *See* Cournot, J.
Eugène, F., lubricants used in cutting of metals, 97
Evain, A., power station at Herserange Steel Works, 214
Evangulova, E. P. *See* Golovin, G. F.
Evans, A. W., and **O. H. Jacobson**, dust suppression at foundry knock-outs, 471
Evans, D. J., collodion replicas, 104; comparison of collodion and Formvar replicas, 104
Evans, E. R., fluidity of molten cast iron, 92
Evans, F.-C., radiation recuperators, 473
Evans, H. T., jun., *See* Erd, R. C.
Evans, J. A., crane runway design, 477
Evans, J. W., applied thermodynamics, 112
Evans, U. R., corrosion and stress, 377; electrochemical corrosion, 244; sprayed aluminium coatings, 108; statistical methods in metallurgy, 246
Everhart, J. L., impact extruded parts, 475; nodular or ductile irons, 469
Ewing, S. P., hydrogen sulphide corrosion 243
Eymann, C., 'iron-coke' for blast-furnace operation, 82

Fabritius, H. *See* Baerlecken, E.
Fackert, W., oxide layers on hot-rolled strip and plate, 233; regeneration of spent pickle liquor, 97
Fagan, B. *See* Waber, J. T.
Fagerberg, B., and **L. Wellenius**, grinding tests at Malmberget, 478
Fairbanks, H. V., and **F. J. Dewez, jun.**, effect of ultrasonics on heat-treatment of steel, 93
Fak'kova, O. B., spectrographic determination of oxygen in steel, 491
Fancutt, F., painting and protection of steel structures, 99
Fanning, F. H., foundry refractories, 83; *see also* Hart, H. G.
Farmer, P. J., xeroradiography, 241
Farquhar, J. C., combustion efficiency, 213
Farrington, E. F., blast-furnace slag as concrete aggregate, 85
Fast, J. D., and **M. B. Verrijp**, *Paper*: "Solubility of Nitrogen in Alpha Iron." *Discussion*, 52. *Correspondence*, 55.
Fastje, D., Krupp-Renn process, 217
Faust, C. L. *See* Safranek, W. H.
Fedorova, A. I. *See* Aikazyan, E. A.
Fedot'ev, N. P., and **G. G. Khad'mash**, electrochemical removal of Zn from galvanized iron, 365
Fedotov, S. G. *See* Lozinskii, M. G.; *also* Osipov, K. A.
Feely, F. J., M. S. Northup, S. R. Kleppe, and **M. Gensamer**, brittle failure of tankage steel plates, 241
Feigin, G. D. *See* Ryabokon, N. K.
Felbeck, D. K., and **E. Orowan**, brittle fracture of steel plates, 369
Feliu, S. *See* Boned, J. A.; Serra, M.
Feliu, S., and **M. Serra**, electrolytic polishing, 380, 479; etched metallic surfaces, 489
Felt, A. E., precision forge–roll process, 363; steel propellers, 363
Fenger, F., salt-bath furnace treatment of landing gears, 226
Fernbach, H. R., flying shears, 72
Ferrett, D. J., and **G. W. C. Milner**, Barker square-wave polarograph, 381
Ferry, R. *See* Calmettes, J.
Ferry, R., and **C. Roques**, soundness of heavy forge ingots, 86
Fertik, N. A., brittleness of nitrided layer, 486
Fetters, K. L., steelmaking developments, 86
Fettweis, K., Brinkmann oil burner, 353
Feucht, H. *See* Zörner, A.
Fielder, W. M., evaluation of iron ore properties, 351

Figge, P. K., spheroidal graphite cast iron, 92
Filimonov, L. N., synthetic standard samples for spectrum analysis, 491
Filipov, S. N., rolling repeated shapes, 230
Filonenko, B. F. *See* Arsenishvilil, A. Yu.
Finch, L. J. *See* Samuel P.
Findley, W. N., and **J. J. Poczatek**, creep in bending, 101
Fink, K., W. Lueg, and **G. Bürger**, ductility of unalloyed and lightly alloyed steel during hot upsetting, 228
Finkel', V. M., design of X-ray camera, 487
Finkel'shtein, D. N., photocolorimetric determination of Mn in ores and minerals, 495
Finkel'shteĭn, Ya. S. *See* Ludenskiĭ, I. M.
Finnern, B., salt-bath tempering for constructional steel, 360
Fischer, H., inhibition of corrosion and metal deposition, 379; nomenclature of corrosion-inhibition and corrosion-inhibitors, 380
Fisher, J. C., dislocations, 373
Fishlock, D. J., degreasing systems, 97
Fletcher, W. D. *See* Shyne, J. J.
Fleurquin, J., steel recuperators, 352
Flinn, R. A., W. B. Pierce, F. R. Smith, and **P. F. Youngdahl**, shell cast metals, 91
Florio, J. V., N. C. Baenziger, and **R. E. Rundle**, compounds of thorium with transition metals, 492
Foex, M. *See* Trombe, F.
Földes, G. *See* Russenberger, M.
Foley, E. F., jun., conversion coatings for cadmium and zinc, 235
Fomin, S. F., crack-formation in cast-iron moulds, 221
Foner, S., Hall effect in permalloys, 370
Forbes, R. J., Tubal Cain, 246
Ford, H., tensile properties of metals, 484; *see also* Lianis, G.; Watts, A. B.
Ford, S. D. *See* Mott, B. W.
Foreman, A. J. E., dislocation energies in anisotropic crystals, 107
Forestier, H., and **A. Clauss**, mechanical resistance of wires, 484
Form, G. W., and **W. M. Baldwin, jun.**, ductility of austenitic stainless steel, 101
Forscher, F., yield rate of mild steel, 237
Forss, L. *See* Gummeson, P. U.
Forster, J. A. B. *See* Gordon, A. R.
Forster, J. B., master alloys in foundry, 223
Forstmeyer, A., fine wire technology, 94
Foryst, J. *See* Smiatowski, M.
Foster, E. L., jun. *See* Saller, H. A.
Fotiadi, A., failure of machine parts, 487
Foulke, D. G., electroplating in U.S.A., 99
Foulle, P., American rolling mills, 229
Foulon, J., testing cast irons, 92
Fourment, M., electrometallurgy, 225, 357
Fowler, C. A., jun., and **E. M. Fryer**, magnetic domains in thin films of nickel-iron, 487
Fraenkel, B. S. *See* Alexander, E.
François, J., insulating bricks, 83
Frank, F. C., hexagonal networks of dislocations, 374
Frank-Kamenetskiĭ, V. A., and **A. I. Komkov**, X-ray goniometric investigations of crystals, 487
Franks, A., and **J. Holden**, investigation of fatigue of metals by X-ray scattering, 240
Fransson, S. *See* Sandford, F.
Frasch, J., inhibition in aqueous medium, 494
Fraunberger, F., metallographic investigations on magnetic alloys, 372
Frechette, V. D., microscopy and moulding sands, 224
Freeman, J. W. *See* Towe, G. C.
Freeman, J. W., and **C. L. Corey**, microstructure and creep, 485
Freitag, E. H. *See* Bowden, E. P.
French, E. L., electric furnaces with higher voltages, 87
Freudenthal, A. M., and **J. H. Weiner**, thermal aspect of fatigue, 240
Frey, D. N. *See* Morgan, E. R.
Fridman, G. E. *See* Taits, E. M.
Fridman, Ya. B. *See* Drozodvskiĭ, B. A.
Friedel, J. *See* Crussard, C.
Friedmann, N. E., Y. Yamamoto and **D. Rosenthal**, torsional problems and electrical analogy, 484
Frimer, A. I. *See* Popenova, I. I.
Frith, J. G., hydraulic accumulators in heavy industry, 362; modern forging presses, 190, 200
Fritts, C. J., corrosion control on offshore drilling, 243
Fritz, I. C., 'cold galvanizing', 235; corrosion protection by cold galvanizing, 108
Fritzlen, G. A. *See* Spendelow, H. R., jun.
Frohberg, M. G., reaction of carbon and oxygen in liquid iron, 473
Frohmberg, R. P., W. J. Barnett, and **A. R. Troiano**, delayed failure and hydrogen embrittlement in steel, 102
Fromblom, J. B., and **H. W. Hiemke**, steel carburizing, 226
Froment, M. *See* Brouillet, P.
Frost, N. E. *See* Johnson, A. E.
Frye, W. C. *See* Burleigh, T. E., jun.
Fryer, E. M. *See* Fowler, C. A., jun.
Fujie, T. *See* Arakawa, M.
Fujii, T. *See* Shimokawa, Y.
Fuklev, V. A., and **M. A. Khabarov**, tuyere for blowing oxygen into cupola forehearth, 471
Fuller, W. R., organic coatings for electroplating, 480
Fullman, R. L., and **R. M. Parke**, G.E.C. research laboratory, 380
Funaki, E. *See* Nagashima, K.
Funk, E. J., protective atmospheres, 226, 360; *see also* Begeman, M. L.
Fuqua, J. H., effect of nitrogen on solidity of steel castings, 357

Gabler, F., surface testing, 485
Gabriel, A. H., and **D. W. O. Heddle**, extension of Noar's method of calibration plates for spectrophotometry, 495
Gaev, I. S., and **V. V. Polovnikov**, measuring austenite grain, 373
Gagnaire, L., Heurtane gas, 353
Gale, W. K. V., hand-wrought chains, 496
Galey, J., and **N. Denis**, end-point determination of Thomas operation, 87
Galey, J. G. *See* Leroy, P. J.
Gallant, R. A. *See* Benda, E. K.
Gallear, C. A., dust collection in sintering plant, 467
Gandhi, P. H. *See* Singh, S.
Gandolfi, U. *See* Bianchi, G.
Gardina, L. I., low-temperature treatment of Cr–Mn–W tool steel, 360
Garf, M. E., fatigue testing with polyharmonic stress-change cycle, 483
Garger, K. S., and **V. D. Umnov**, end of blow of Bessemer converter, 469
Garger, K. S., V. D. Umnov, and **G. D. Krivulya**, spectrum of Bessemer flame, 355
Garkunov, D. N., and **A. A. Polyakov**, anti-friction properties of porous chromium deposits, 103
Garner, F. H., and **A. R. Hale**, corrosion in petroleum industry, 108
Garrod, R. I., and **J. H. Auld**, X-ray line broadening from cold-worked iron, 101
Garski, W., bearing problems on high-power gas engines, 477
Gascuel, L., heat-treatment, 473
Gashukov, V. S. *See* Sokolovskiĭ, V. I.
Gattenmeyer, J. L., F. W. Hewes, and **W. H. Seager**, corrosion control in oil and gas producing equipment, 108
Gatto, F., extrusion theory, 475
Gautier, E. H., adjustable voltage ore bridges, 476
Gay, P. J., protective function of paint coatings on metals, 99
Gayer, P., non-destructive testing, 371
Gayle, J. B., and **W. H. Eddy**, carbonizing tests, 353
Gebhardt, E., and **W. Köster**, reaction of iron with liquid Al, 366
Gedevanishvili, G. K., failure of Tafel's method, 229
Geguzin, Ya. E., L. O. Markon, and **B. Ya. Pines**, self-diffusion and flow in compacted metal powders, 367
Gélain, J., and **A. Barat**, tensile strengths of cast iron test pieces, 368
Geller, Yu. A., mechanical properties of tool steels, 372; transformations during tempering, 375
Gellings, P. J., polarization curves in corrosion research, 492
Gel'man, A. S., and **V. S. Popov**, residual stresses in butt joints of tubes, 368
Gemmill, M. G., H. Hughes, J. D. Murray, F. B. Pickering, and **K. W. Andrews**, *Paper*: "Study of 7% and 8% Chromium Creep-resisting Steels", 122
Gemmill, M. G., and **J. D. Murray**, bolting materials for steam plant, 372
Generozov, B. A., chemical testing in metallurgical works, 380
Gensamer, M. *See* Feely, F. J.
Genshaft, S. A., V. V. Nalimov, and **V. G. Pines**, chemical analysis of non-alloy steels, 244
Gentry, C. H. R. *See* Davis, G. L.
Gerasimova, N. G., T. F. Ivanova, N. S. Sventitskiĭ, G. P. Startsev, K. I. Taganov, and **M. E. Trentovius**, spectrometric determination of H in metals, 491
Germain, P., rheo-electric analogue, 242
Gerold, V. *See* Berthold, R.
Gerrard, J. S., cathodic protection in tankers, 494; corrosion and cathodic protection in Kuwait, 379
Gertsman, S. L. *See* Shnay, R. C.
Gertz, G., gas-tight cast iron for refrigerators, 89
Gesell, W., and **W. Riege**, transport aids in foundries, 96
Geskin, S. A., and **P. V. Savkin**, rolling tubes of exact dimensions on continuous mill, 476
Getsov, L. B. *See* Zamyatnin, M. M.
Gettrust, J. S., utilization of waste pickling acid, 234
Geuder, R. A., and **W. R. Hough**, D.C. motor design, 231
Giannone, A., and **L. Massimilla**, testing strength of refractories, 216
Gibbons, D. *See* Belcher, R.
Gibson, R. C. *See* Cavanagh, W. R.
Giessmann, E., plastic deformation of steel, 238
Giessmann, E.-J., deformation of steel tensile rods, 368
Gilbert, F. L., tooling with phenolic casting resins for sheet-metal pressing, 474
Gilbert, G. N. J., microstructure and mechanical properties of nodular cast irons, 89
Gilbert, L. O. *See* Ledford, R. F.
Gilbert, L. O., S. L. Eisler, J. Doss, and **W. D. McHenry**, phosphate coating retention during cold extrusion, 98
Gille, B., metallurgical treatises of 16th to 18th centuries, 246
Gilman, J. J., deformation of metal monocrystals, 488
Giminez y Sanmartin, A., steelmaking with solid slag, 356
Gimmel, P. *See* Wellinger, K.
Gindin, L. G. *See* Putilova, I. N.
Gintsburg, Ya. S., pre-treatment in stress-relaxation tests, 239
Girardi, U. *See* Guerra, U.
Girschig, R. *See* Cournot, J.
Gittings, E. F. *See* Goranson, R. W.
Gledhill, P. K., and **C. Lang**, *Paper*: "Sintering Characteristics of a Cleveland Ironstone", 434
Gleiser, M., W. L. Larsen, R. Speiser, and **J. W. Spretnak**, oxidation-resistant scales on Mo alloys, 489

Glen, J., acid Bessemer process, 438
Glenn, R. A. *See* Rose, H. J.
Glikman, L. A., and **L. A. Suprun**, corrosion-fatigue strength, 483
Glikson, A. Ya. *See* Nezdoimin, I. K.
Glinkov, M. A., flame studies in O. H. furnaces, 219
Glossbrenner, A. B., hot scarfing, 231
Glover, S. G., and **T. B. Smith**, stabilization of austenite, 375
Godel, A., 'Ignifluid' combustion technique, 467
Godot, D. *See* Bader, O.
Goetcheus, P., and **R. Boring**, electrode for metal arc welding, 364
Gogek, C. J., foundry core sand binder, 225
Gohn, G. R., metal fatigue, 240
Goldberg, E. D. *See* Bien, G. S.
Goldblatt, A. *See* Bartel, R.
Golding, I. L. S., additions to titania opacified enamels, 98
Goldmacher, R. C., ballast circuit design, 483
Goldschmidt, H. J., delta-ferrite, 58, 59; sigma-phase nucleation in Fe–Cr system, 375
Gol'dshtein, M. E., thickness of passivated zinc coatings, 236
Gol'dshtein, M. I. *See* Bolotov, I. E.
Goldsmith, W. *See* Mark, J. W.
Golikov, V. M., and **V. T. Borisov**, determination of diffusion coefficients, 243
Golovin, G. F., and **E. P. Evangulova**, hardened layer in induction hardening, 485
Gomberg, H. J. *See* Towe, G. C.
Gombert, M., study of steelmaking factors by Galey opacimeter, 219; *see also* Trentini, B.
Gombert, M., and **J. de Hedouville**, industrial results with Bessemer converters, 218
Gomel'skiĭ, K. Z., P. N. D'yachkov, È. N. Rodigina, and **D. A. Startsev**, tube furnace, 367
Goodeve, Sir C., *Paper*: "Steelmaking Since Bessemer", 113; biographical note, *facing*, 112; science and industrial management, 112
Goodwin, W. P., expansion in Australian steelmaking, 468
Goosens, H. *See* Görlich, H.-K.
Goranson, R. W., D. Bancroft, B. L. Burton, T. Blechar, E. E. Houston, F. Gittings, and **S. A. Landeen**, compressibility of metals, 239
Goransson, K. F., Bessemer steel, 382
Gorbunov, B. M., electrospark surface machining of rolls, 364
Gordon, A. R., and **J. A. B. Forster**, corrosion of boilers, 378
Gordon, F. R., J. Rogers, B. Russell, and **L. C. Trewern**, New Zealand bentonites, 222
Gore, R. T., alloy plating, 98; *see also* Lowenheim, F. A.
Gorenshtein, M. M., N. I. Petrulevich, and **G. V. Tomashevskaya**, rolling thick sheet, 95
Görlich, H.-K. *See* Koerfer, E.
Görlich, H.-K., H. Goosens, and **H. Schenck**, quench-ageing of soft unalloyed steels, 369
Görlich, H.-K., E. Koerfer, G. Obelode, and **H. Schenck**, Zephirol etch, 490
Gorozhaninov, N. E., welding practice in blast-furnace construction, 232
Gorozhankina, N. P. *See* Sukhenko, K. A.
Gosling, R. S., flying shears, 73
Goto, H. *See* Konishi, I.
Gotô, H., S. Susuki, J. Kimura, and **A. Onuma**, determination of oxygen in cast iron, 110
Gotô, H., and **T. Watanabe**, non-metallic inclusions in cast iron, 105
Gotô, S. *See* Takano, S.
Graf, R., zone melting, 220
Graff, A. *See* Steffes, M.
Graham, A. L. *See* Dietert, H. W.
Graham, G. M., obituary, 78
Graifer, E. Z., and **I. V. Salli**, graphite formation during vacuum heat-treatment, 359
Grainger, J. A., deep-drawing and spinning of sheet metal, 94; Wellman-Galusha producer installation with Whessoe gas-cleaning plant, 215
Grandori, G., jointing of metals, 478
Granger, L., and **J. Papier**, 100 years of metallurgy, 382
Grant, N. J., grain-boundary precipitation, 485; *see also* Monkman, F. C.
Grant, N. J., A. G. Bucklin, and **W. Rowland**, creep rupture properties of cold-worked stainless steel, 103
Gras, W.-D. *See* Wittmoser, A.
Grass, W., non-magnetic steels, 104
Grassi, R. C. *See* Cornet, I.
Gravenstreter, P. R., and **R. E. Layton**, automation in electrolytic tinning, 98
Gray, A. G., metal fatigue, 240
Gray, B., *Paper*: "The Effects of Gravity on the Solidification of Steel". *Discussion*, 447. *Correspondence*, 449. *Author's Reply*, 449; ingot structure, 449; obituary, 349
Gray, F. A. *See* Southern, H.
Greday, T. *See* Habraken, L.
Green, A. E., hypo-elasticity and plasticity, 103
Green, G. W., obituary, 462
Greene, R. J., and **F. G. Sefing**, cast irons in high-temperature service, 89
Greenwell, H. E., R. Loncaric and **H. G. Byars**, use of ammonia to prevent casing corrosion, 243
Griest, A. J., J. F. Libsch, and **G. P. Conard**, effect of Si and Al on ordering reaction in Fe–Co, 106
Griffin, E., cold roll-forming and manipulation of light-gauge sections, 94
Griffith, C. B., and **M. W. Mallett**, vacuum degassing of Ti, 360
Grigor'ev, F. N., durability of open-hearth furnaces with Dinas roofs, 470
Grigoryan, V. A., and **A. M. Samarin**, determination of non-metallic inclusions in ball-bearing steel using radioactive calcium, 491
Grikit, I. A., spectrographic analysis, 491
Grimm, W. *See* Möller, H.
Grimsley, J. D. *See* Rosenberg, S. J.
Grinzaid, E. L. *See* Zamyatnin, M. M.
Grishchenko, M. P., and **A. B. Shaevich**, spectrographic analysis of electrolytes for Zn and Ni plating baths, 495
Grobe, A. H., and **G. A. Roberts**, prealloyed steel powders, 366
Grodzinski, P., micro-hardness testing, 369; small-load hardness, 103
Grönegress, H. W., flame hardening of foundry iron, 226
Gross, J. H., and **R. D. Stout**, effect of microstructure on notch toughness, 239
Grosse, W., fusion welding of structural steel, 96
Grosvenor, G., heating up open-hearth furnaces with natural gas, 82
Grott, G. J., and **H. F. Taylor**, reactions during core baking, 225
Grover, H. J. *See* Hyler, W. S.
Grubb, P. E. *See* Linford, H. B.
Grube, K. R., and **J. G. Kura**, vertical gating, 222
Grundig, W., mean stress level in metallic matrices, 223
Grüner, P., and **E. Kraft**, friction-lift drop hammer, 228
Grüner, P., and **E. Taubert**, hot and cold pressing tools, 474
Gruzin, P. L., Yu. A. Polikarpov, and **M. A. Shumilov**, diffusion of carbon in metals, 246
Gruzin, V. G., control of temperature of steel during pouring, 467
Gruzinov, V. K., horizontal distribution of materials in throat, 216
Gubahn, J. D., grade propagation and size effect on mild steel, 369
Gubarev, A. G., hot-blast gate valve, 468
Gubert, S. V. *See* Ryabokon, N. K.
Gudkova, T. I. *See* Bokshteĭn, S. Z.
Guenot, M., statistical methods, 382
Guérin, H. *See* Bastick, M.
Guerra, U., and **U. Girardi**, calculating welded joints, 364
Guhl, A., intermediate refining of cast iron, 471
Gühring, A., influence of carbide formation on performance of high-speed drills, 369
Guidi, A. P., ladle practice, 90
Guinier, M., structure of supersaturated solid solutions during age-hardening, 104
Gulbransen, E. A., mechanism of oxidation of metals, 490; *see also* McMillan, W. R.
Gulbransen, E. A., and **K. F. Andrew**, oxidation of Ni–Cr heater alloys, 489
Gulbransen, E. A., W. R. McMillan, and **K. F. Andrew**, reaction of iron with oxygen, 107
Gulyaev, A. P. *See* Alfimov, A. N.
Gulyaev, A. P., and **M. P. Zel'bet**, tempering of high-carbon steel, 105, 361
Gulyaev, A. P. and **V. M. Zalkin**, isothermal formation of austenite, 376; phase transformation in steel, 376
Gummeson, P. U., and **L. Forss**, Cu additions to iron powder, 481; Cu additions to iron powder compacts, 237
Gumz, W., fuel and power resources in Germany, 352
Gurevich, M. A., and **B. F. Ormont**, structure of carbide phases in V, 482
Gürtler, G., and **K. Sagel**, growth layers in reaction of solid iron with Al, 480
Gustafson, R. A., nickel chrome brazing of stainless steel, 233
Gustafsson, C. E., precision casting, 358
Guthmann, K., measurement of dust content in industrial gases, 215; temperature measurement and control of steel melts, 82; Unimul burner, 353
Guyon, M., steels for prestressed concrete, 111
Guzev, E. M., treatment and utilization of steel shavings, 219

Haarman, R., metallic zinc as corrosion protector, 108
Habraken, L., and **A. de la Motte**, structural hardening in low alloy steels, 104
Habraken, L., and **T. Greday**, metal deformation, 104
Hachiya, S., steelmaking process in Japan, 217
Hackerman, N. *See* **Makrides, A. C.**
Haddrell, V. J., E. C. Sykes, and **B. W. Mott**, plastic laps for preparation of specimens, 105
Hadfield, D., magnetic measurement of hardness of metals, 487
Hadley, R. L., and **L. M. Bianchi**, hydrogen deoxidation of vacuum-melted high-temperature alloys, 359
Hagelbarger, D. W. *See* Pfann, W. G.
Hahnemann, H. W., wear tests, 103
Hair, W. J., corrosion work by British Railways Research Department, 379
Halder, B. *See* Krishnan, A. A.
Hale, A. R. *See* Garner, F. H.
Hall, A. J., corrosion in dyeing and finishing works, 108
Hall, A. M., special steels, 489
Hall, E. *See* Cohen, J.
Hall, E. O. *See* Street, R.
Hall, H. F., and **R. W. Nichols**, *Paper*: "Yield Behaviour of Metals at Low Temperatures with Particular Reference to some Carbon and Low-Alloy Steels". *Discussion*, 452. *Authors' Reply*, 455
Hall, J. F. *See* Tolmon, F. R.
Hall, N., technical developments of 1955, 97
Hall, R. C., G. P. Conard, and **J. F. Libsch**, ordering and magnetic heat-treatment of 50% Fe–50% Co alloy, 106

Halliday, W. M., chills in sand moulds, 91; dies for bending operations, 362; inverted-type piercing die, 474
Hallows, I. S., international review of metal finishing, 99
Halm, L., casting-pit refractories, 468
Halter, D. E. *See* Banning, L. H.
Ham, J. L., and **F. L. Carr,** vacuum-melted Fe–Cr alloys, 359
Hamaker, H. C., efficient experimentation, 246
Hamer, P., prevention of scale and corrosion in boilers, 493
Hamilton, A. D. C., marine paints, 237
Hammer, D. F., stock removal in case hardening, 361
Hammond, P., magnetic screening effect of iron tubes, 496
Hanák, K., grey cast irons for castings, 89
Hancke, A., hardening of screws, 228
Hancke, D. *See* Neumann, F. W.; Thurman, A. L.
Hancock, R. A. *See* Turkdogan, E. T.
Hank, V., strain measurement by X-rays, 368
Hannah, J. Dickson, biographical note, *facing* 248
Hansen, H. J. *See* Mortenson, M.
Hansen, M., flow in iron and steel works, 82
Hansen, N. A., 11-in. rod mill at Jones and Laughlin's Aliquippa plant, 229
Harbron, J. D., Canadian tinplate, 235
Harding, G. W., barrel plating, 235
Hargreaves, L., flying shears, 73
Harms, K. G., use of nylon rolls in forming prefinished strip, 95
Harris, J. C. O., steelmaking processes in U.S.A., 86
Harris, J. L., surface hardening, 361
Harris, T. R., correspondence of XIXth century ironfounder, 382
Harris, W. R., regulator systems, 477
Hart, H., steelfoundry practice, 222
Hart, H. G., and **F. H. Fanning,** refractories for electric-furnace roof, 468
Hart, H. 't, sand blasting, 234
Hartleif, G., and **H. Kornfeld,** spectrochemical analysis of clays and fireclays, 245
Hasegawa, T., O. Ochiai, and **J. Ino,** mechanical properties at elevated temperatures of Timken 16–25–6, 242, 489
Hatch, G. B., control of couples in water systems, 109
Hathaway, J. C. *See* Parker, C. J.
Hauck, M., STEC and Krause burners, 353
Haufe, W., selection of high-speed steels, 104
Hauffe, K., application of theory of disorder to development of non-scaling alloys, 367
Haught, R. S. *See* McDaniel, G. R.
Hauk, V., radiographically and mechanically measured strains in cast iron, 240
Haul, R. A. W., thermal decomposition of dolomite crystals, 354
Hauptly, J. J. selection of steels, 372
Hausner, H. H., sintering, 367; *see also* Kimura, T.
Hausner, H. H., and **I. Sheinhartz,** friction and lubrication in powder metallurgy, 100
Hauttmann, H., weldable rimmed structural steel, 477
Hauttmann, H. F. *See* Trenkler, H.
Havel, O., and **V. Charvát,** assessing quality of blast-furnace coke, 467
Hawkins, J. E., and **G. Nonhebel,** chimneys and dispersal of smoke, 467
Haynes, R., structural iron of Parthenon, 408
Hebberling, H., rust protection, 99
Heczko, M. A., blast furnace stack shell, 84
Heddle, D. W. O. *See* Gabriel, A. H.
Hedges. E. S., chemical protective treatment for tinplate, 480
Heilmann, G., colorimetric determination of free cyanide in electrolytic baths, 244
Heimann, K. W., precision casting, 359
Hein, J., soaking pits with regenerators, 225
Heindl, R. A., J. A. Ruppert, M. L. Skow, and **J. E. Conley,** manganese from steel-plant slags, 86
Heine, H. J., foundry progress, 357
Heine, R. W., moulding sands, 471; *see also* Zrimsek, A. H.
Heinen, H. J. *See* Engel, A. L.
Heinrichs, W., properties, nodular graphite cast iron, 472
Heinrichs, W., and **W. Brüker,** metallurgical hot-blast cupola, 222
Heinrichs, W., and **A. Dahlmann,** growth of austenitic cast iron, 472
Helbig, W. A., water purification with activated carbons, 479
Held, F., ultrasonic cleaning, 365
Helin, E. *See* Johansson, E.
Heller, P. A., foundry practice, 470
Helms, J. W. *See* Leland, J. F.
Hempel, M. *See* Wever, F.
Hendus, H. *See* Bühler, H.
Hendus, H., and **G. Kraus,** alternating bending strength of Armco iron, 240
Hendus, H., and **C. Wagner,** elasticity and internal stress measurements, 361; X-ray stress measurement, 240
Henke, R. W., corrosion, 492
Hennessey, W. J. *See* Brown, L. J.
Henon, G., special foundry irons, 223
Henschker, E. R., flying shears, 69
Hense, V. E., and **D. P. Buswell,** steel selection and heat treatment for automotive gears, 489
Henshall, B. *See* Caney, R. J. T.
Hensley, J. W., and **R. D. Ring,** metal cleaning studies, 478
Henwood, J. B., high-temperature gaseous jets, 360
Herbiet, H., and **L. Cyaplicki,** Belgian research on machining properties of metals, 97
Hergert, W. F. *See* Banning, L. H.
Herglotz, H., double-cone method, 104
Herr, W., trace analysis using radioactive isotopes, 244
Herrmann, R. H., shell moulding at Lynchburg, 91
Hersche, W., reclamation of incandescent heat of coke, 353
Hesler, J. C., treatment of metal finishing wastes, 365
Hess-Birscher, W., corrosion research using Aerosols, 492
Heuberger, J., compressibility of iron powders, 366; pores in sintered bodies, 367
Heurtey, P., large capacity gas producers, 353
Hewes, F. W. *See* Gattenmeyer, J. L.
Hewson, T. A., automatic control in fatigue tests, 483
Heynert, G. *See* Oelsen, W.
Hibbard, W. R., jun. *See* Dunn, C. G.
Hicks, J. R. *See* Krummell, H. D.
Hiemke, H. W. *See* Fromblom, J. B.
Higgs, D. G. *See* Bush, G. H.
Hijikata, K., sintering of mixed powders of iron and nickel, 99
Hila, E. *See* Teindl, J.
Hill, E. G., obituary, 349
Hill, G. R. *See* Tuddenham, W. M.
Hiller, H. M., hardening temperature of steels, 228
Hilterhaus, W., material-flow diagrams in steelworks transport, 96
Hines, J. G., biographical note, 349
Hines, J. G., and **T. P. Hoar,** *Paper*: "The Stress-corrosion Cracking of Austenitic Stainless Steels: Part II", 166
Hinle, J., welding of clad steels, 96
Hintzpeter, U. *See* Seeman, H. J.
Hiorns, F. J., brittle fracture and strength of materials, 369; mechanical properties of coal, 352
Hoar, T. P., anodic inhibitors of corrosion 378; *see also* Hines, J. G.
Hoare, G. G., anomalies in specifications, 482
Hoare, W. E., quality of tinpl e, 480
Hoch, G. *See* Bungardt,
Hoch, J., bainite harden igh-speed tool steels, 227
Hofer, L. J. E. *See* Cohn, f.
Hoff, R. L., and **A. M. Bounds,** vacuum heat-treating techniques, 359
Hofmann, E., DEMAG-Humboldt low-shaft furnace process, 84
Hofmann, E.-G., and **H. Jagodzinski,** high-resolution X-ray fine structure apparatus, 104
Hofmann, W., G. Schuhmacher, and **J. M. Sistiaga,** crystallographic relationships, 490
Hohn, F. H., non-destructive testing of castings, 101
Holden, J. *See* Franks, A.
Holgate, S. M., molybdenum spraying, 236
Holland, J. W., L. D. Stevens, and **N. R. Arterburn,** solution level control, 479
Holman, R. W., automatic control in steel industry, 96
Holth, T., creep of metal crystals, 483
Homer, C. E., predicting behaviour of metals, 482
Honda, K., and **M. Sato,** theory of transformation stress, 490
Honda, Y. *See* Sato, T.
Honeyman, A. J. K., ingot cooling, 443
Honjo, T., volumetric estimation of Al, 380
Honzík, M., effect of Mo additions on chilled cast iron rolls, 230
Hopkins, B. E. *See* Allen, N. P.
Hořejš, S. *See* Myslivec, T.
Horn, G., and **M. W. Thring,** effect of density differences on path of jets, 225
Horner, C., A. G. Winger, G. W. Bodamer, and **R. Kunin,** electrolytic treatment of waste sulphate pickle liquor, 479
Horsman, D. C., high-speed rod rolling, 363
Horstmann, D., attack by iron-saturated zinc melts, 235, 480
Horvick, E. W., zinc coatings, 235
Hotta, H., and **I. Tatsukawa,** austempering for low-alloy steels, 361
Houdremont, E. *See* Dahl, W.
Houdremont, E., and **W. Reich,** alloy steels, 458
Houdremont, E., W. Wepner, and **H. J. Wiester,** ageing of soft unalloyed steels, 369
Houdremont, E., and **H. J. Wiester,** properties of steel, 368
Hough, W. R. *See* Geuder, R. A.
Houghton, E. C., modern forging presses, 195
Houston, E. E. *See* Goranson, R. W.
Housz, A. H. Ingen, nomination as President-Elect, 462
Howe, J. P., materials for nuclear power, 494
Huber, F., gas turbines in iron and steel industry, 82
Huck, G. *See* Klempt, W.
Huddle, F. P., nickel conservation with high-manganese stainless steels, 104
Huebler, J. *See* Turin, J. J.
Huggins, R. A., H. Udin, and **J. Wulff,** formation of austenite in plain carbon steels, 376
Hughes, H., biographical note, 349; *see also* Gemmill, M. G.; Pryce, L.
Huizenga, L. R. *See* Talor, V. J.
Hultén, S. I., iron powder metallurgy in Europe, 481
Hultgren, A., delta-ferrite, 60
Hulthen, S. I., sintering of iron powders in Europe, 481
Humenik, M., jun., and **N. M. Parikh,** cermets, 481
Humphrey, R. C., metalworking plant at Westinghouse Electric Corp., 94
Humphreys, R. L., roll-neck bearing design, 95
Hundy, B. B., anistropy of strain-ageing of temper-rolled mild-steel sheet, 476; solubility of carbon and nitrogen, 54; strain ageing, 66

Hundy, B. B., and **T. D. Boxall,** effect of bending on temper-rolled mild steel, 476
Hurst, W. D. *See* Baracos, A.
Husson, F., R. Durand, and **G. Cohen de Lara,** flow of gases in O.H. furnaces, 219
Husson, G. *See* Allard, N.; Michaud, M.
Husson, G., A. Peters, G. Jomier, and **R. Kissel,** atomizing fuel oil in open-hearth furnace, 82
Hüttemann, P. *See* Vorwerk, O.
Hutton, A. K., nondestructive testing in shipbuilding, 488
Hyam, E. D., biographical note, 209
Hyam, E. D., and **J. Nutting,** *Paper*: "The Tempering of Plain Carbon Steels", 148
Hyler, J. E., flame hardening, 473; industrial brazing, 478
Hyler, W. S., and **H. J. Grover,** surface hardening, 361
Hyman, J. B. *See* Childs, W. J.

Ignatowicz, S. *See* Turkdogan, E. T.
Iida, M. *See* Takano, S.
Il'ina, S. M. *See* Sukhenko, K. A.
Il'ina, V. A., and **V. K. Kritskaya,** interatomic bond strength and static distortions in alloyed ferrite crystals, 482
Ilschner, B., temperature-dependence of free energy of solid solutions, 105
Imai, H., residual stress in cold-drawn steel tube, 240
Imai, Y., and **T. Ishizahi,** nitrogen as alloying element in steels, 371
Imai, Y., Y. Ishizaki, and **K. Shishido,** effect of nitrogen on corrosion-resistance of steels, 371
Imai, Y., and **K. Kumada,** anomaly of α solid solution of Fe–Cr system, 107
Imura, T. *See* Suzuki, T.
Iñarrairaegui, P. Ma., calculation of feeder heads, 223
Ineson, E., biographical note, 209
Ineson, E., J. Clayton-Cave, and **R. J. Taylor,** *Paper*: "Variation in Fatigue Properties Over Individual Casts of Steel: Part I", 178
Inlow, H. C., roll neck lubrication, 364
Ino, J. *See* Hasegawa, T.
Ionova, K. I., and **V. V. Nalimov,** spectrographic analysis of non-alloy steels, 491
Ipatov, N. K., I. Ya. Aizenshtok, and **L. D. Kossovskii,** carbide network in bearing steels, 105
Irvin, J. W., oxygen converter process, 355
Irvine, K. J., ultra-high-strength steels, 111
Irving, E. M., Indonesian mineral resources, 351
Isaichev, I. V., orientation of cementite in tempered carbon steel, 490
Ishida, H., and **S. Yaji,** low-temperature brazing, 233
Isihara, T., and **K. Sudo,** dissociation pressure of pyrites, 496
Ishihara, Y., special steel making process in Japan, 356
Ishizaki, T. *See* Imai, Y.
Iskhakov, R. B. *See* Plokhov, V. N.
Issa, I. M., and **R. M. Issa,** oxidations with alkaline permanganate, 245
Issa, R. M. *See* Issa, I. M.
Itzel, M. clay bonding agents, 90
Iudin, V. E. *See* Osipov, A. I.
Iudin, V. E., M. L. Sazonov, and **A. I. Osipov,** radioacitvity of metal samples 495
Iungmann, G., cast metals in automobile industry, 222
Ivanova, A. N. *See* Skvortsov, G. E.
Ivanova, G. M. *See* Danilovskaya, V. I.
Ivanova, T. F. *See* Gerasimova, N. G.
Ivanova, V. S., and **I. A. Oding,** creep of cast iron with globular graphite, 223
Ivin, N. A., mixed roofs for O.H. furnaces, 218
Iwanciw, E., reduction of metal oxides by carbon, 469
Iwase, K., T. Sano, J. Matsuoka, and **M. Kyotani,** strain tempering by K.R.K. process, 364

Jack, K. H. *See* Cohn, E. M.
Jackson, B. R., siliceous and titanium-bearing inclusions, 63
Jackson, C. E. *See* Wilson, J. L.
Jackson, D., A. J. Stedman, and **R. V. Riley,** acid pickling of mild steel, 365
Jackson, H. E., Seattle plant of Bethlehem Pacific Coast Steel Corp., 355
Jackson, P. J., determination of total S in coal, 110
Jackson, W., R. Wogin, and **R. Johnson,** fuels for open-hearth furnaces, 87
Jackson, W. J., alloy steels, 457
Jacob, A. J., *See* Sopher, R. P.
Jacobson, O. H. *See* Evans, A. W.
Jacobson, R. H. *See* Durelli, A. J.
Jacquet, P., and **R. Mondon,** electropolishing of steel and special alloys, 98
Jäger, W. *See* Trömel, G.
Jagodzinski, H. *See* Hofmann, E.-G.
James, W. G., modern forging presses, 202
Jameson, S. L., ventilation of steel mill equipment, 363
Jamieson, A., colorimetric determination of combined carbon in cast iron, 110
Janák, J., chromatographic separation and analysis of gas mixtures, 245
Jänicke, W., manufacture and service performance of rails, 111
Janssen, K. *See* Jellinghaus, W.
Jaoul, B. J., die wear, 488
Jason, A. C., recording smokemeter, 354
Jasper, A., weaving of spring steel wire, 362
Jawson, M. A., nucleation problem in martensite, 375
Jean, M., estimation of silicon and phosphorus, 109
Jellinghaus, W. *See* Dahl, W.
Jellinghaus, W., and **K. Janssen,** initial permeability of ferrous metals under mechanical strain, 370
Jeníček, L., testing of mould materials, 90
Jeníčková, A. *See* Suk, V.
Jenkins, C. H. M., third-stage creep and fracture, 485
Jenkins, I., special atmosphere furnaces, 360
Jenkner, A., processes for improving coke, 215
Jenni, C. B., heat treatment of steel castings, 93
Jennings, A. P. H. *See* Smith, B. O.
Jenny, R., inhibition of acid corrosion of iron, 494
Jensen, R. S. *See* Cramer, R. E.
Jentet, M., stamping in motor car construction, 362
Johannsen, F., metallurgical reduction processes, 86
Johansson, E., and **E. Helin,** electric hot-topping, 88
Johnson, A. E., and **N. E. Frost,** creep fracture of Mo steel and Cu, 485
Johnson, A. S. *See* Pfarr, F. J.
Johnson, C. A., electrolytic polishing, 365
Johnson, F. D., fuel economy in stoving operations, 480
Johnson, R. *See* Jackson, W.
Johnson, R. C., photoelastic analysis of shafts, 484
Johnson, R. F., R. W. Lewis, jun., and **G. Abele C.,** geology and ore deposits of Atacocha District, 466
Johnson, T. W., *Paper*: "The Measurement of Gas Transit Times in a Blast-furnace," 18; biographical note, 78
Johnson, V. W., rod mill at Colorado Fuel and Iron Corp. Pueblo Works, 95
Johnson, W., metal-forming and shaping operations, 94
Johnson, W. A. *See* Tremlett, H. F.
Johnson, W. J., corrosion prevention in power station water-steam cycle, 378
Jomier, G. *See* Husson, G.
Jominy, W. E. *See* Ross, S. T.
Jonck, R., hardening of cast iron, 361
Jones, A., underground mining in Frodingham ironstone, 213
Jones, A. B. *See* Avila, C. F.
Jones, B., strain ageing, 65; surface finish of grey iron castings, 90
Jones, B., and **R. A. Owen-Barnett,** *Paper*: "Strain Ageing of Pure Iron". *Discussion*, 64. *Authors' Replies*, 68
Jones, F. W. *See* Barker, A.
Jones, H. G., and **A. M. Lee,** statistical study of batch processes, 246
Jones, H. G., D. T. Steer, and **P. D. Dickerson,** ultimate capacity of slabbing mill, 95
Jones, P. R. *See* Woo, D.
Jones, P. W., welding of galvanized steel, 477
Jones, T. E. M. *See* Cottrell, C. L. M.
Jones, W. D., sheet metals from metal powders, 100
Jones, W. I., coal and the future, 214
Josefsson, Å., *See* Lagerberg, G.
Joseph, C. F., pearlitic malleable iron for castings, 222
Josset, M., risering of steel castings, 359
Josso, E., brittleness of Fe–Cr alloys, 369
Jost, H. P., crane lubrication, 96
Joumat, P., spot welding of high-tensile steels, 477; spot welds in semi-hard low-alloy steels, 484
Jourdain, A., creep of refractories, 468
Joussot-Dubien, J., B. Lemanceau, and **A. Pacault,** electronic apparatus for measurement of magnetic susceptibilities, 241
Joyce, D., and **B. Marsden,** iron ores, 80
Jung, H., inductive heat-treatment, 226
Jungblut, F., photometric determination of Co in steels, 109
Jungbluth, H., and **K. Roesch,** cupola combustion, 360
Jungreis, E. *See* Bobtelsky, M.

Kadeřávek, Z., process of metal failure, 100
Kain, C. H., Sir G. Barnett, and **J. H. Wigglesworth,** steel foundry dust control and ventilation, 471
Kakovskii, I. A., and **N. S. Smirnov,** hot tinning of steel sheets, 236
Kakuzen, M. *See* Nishihara, T.
Kalashnikova, A. Ya., and **G. M. Orlov,** slinger-head action and mould packing, 90
Kalivoda, A. *See* Mazanec, K.
Kalling, B., desulphurization of molten pig iron with lime, 355
Kal'ner, D. A. *See* Pridantsev, M. V.
Kargin, A. M. *See* Rogach, A. P.
Karmazin, V. I., concentration of magnetite quartzites, 466; furnaces for magnetic roasting beneficiation of ores, 81
Karnaukhov, M. M., and **A. Kh. Urazgul'deev,** hydrogen in metal in acid open-hearth process, 356
Karrer, C. A., isotopes in steel industry, 488
Karrer, W., blast furnace blowers, 84
Karsulin, M. *See* Markovic, T.
Kasatkin, B. S., fracture of specimens during impact bending, 239; selection of notch for serial toughness-testing, 101
Katagiri, S., chromatic aberration in electron microscope, 488
Kato, T. *See* Okinaka, Y.
Katsufuji, Y. *See* Niwa, K.
Kaufman, G. *See* Ehlert, W. C.
Kaufman, L., and **M. Cohen,** nucleation in martensitic transformation, 375
Kaufmann, G. A., and **S. H. Williamson,** electrification of 44-in. blooming mill, 95

Kauhausen, E., welding of heat-resisting steels, 232
Kautszch, E., mining of iron ores in Eastern Germany, 466
Kawabata, S., and **M. Okami**, desulphurization of pig iron with calcium carbide, 216
Kawai, M., inverted-V segregated zone of ingots, 88, 470, 474
Kawamoto, M. *See* Konishi, I.
Kawamoto, Y. *See* Odazima, H.
Kawamura, K., descaling and chemical polishing with hydrogen peroxide solution, 98
Kawano, K. *See* Miyoshi, E.
Kayser, R. F. *See* Wilhelm, E. J.
Kazak, I. S. *See* Dashevskiĭ, Yu. V.
Kazakov, N. F., wear resistance of cutting tools, 97
Kazarin, V. I., V. A. Titov, and **N. D. Tomashov**, corrosion-fatigue testing, 369
Kear, R. W., corrosion by flue-gas condensates, 379
Kearney, N. W. *See* Reese, S. T.
Kegel, G., radioactive counter for prospecting in Brazil, 112
Kegel, K., depth of chill by induction hardening, 227
Keĭs, N. V. *See* Kolosov, M. I.
Keith, R. E., C. A. Siebert, and **M. J. Sinnot**, intergranular oxidation in stainless steel, 489
Kekelidze, M. A. *See* Arsenishvilil, A. Yu.
Keller, G., nitriding, 227
Kellermann, K., and **G. Lehmann**, fumes and gases in welding with lime-electrodes, 232
Kemmnitz, G., determination of total deformation from X-ray photographs, 240; radiographic strain measurement, 240
Kempka, G. E., properties of malleable iron, 90
Kemsley, D. S., corrosion fatigue by Cr–Mo steel, 493
Kennedy, A. J., creep and recovery property of metals, 103; instrumentation in crystal mechanics, 373; recrystallization in metals, 105
Kenyon, A. F., power supplies for hot strip mill, 476
Kerdman, F. M., rolled metal products, 362
Kerl, E., obituary, 349
Kerlin, W. W. *See* Austin, C. R.
Kerridge, M., metal transfer and wear process, 103
Kesarev, M. P., preventing welding of sheets during hot working, 94
Kessels, K., hot-blast stoves, 82
Kessler, F. M. *See* Romovářkova, H.
Keysselitz, B., tinplate manufacturing methods, 98
Khabarov, M. A. *See* Fuklev, V. A.
Khad'mash, G. G. *See* Fedot'ev, N. P.
Khazanova, T. P., and **Yu. P. Vasin**, high-grade ferro-silicon, 88
Khenkin, M. L., feeding steel castings produced by lost-wax process, 91
Khersonskaya, L. M. *See* Chernikhov, Yu. A.
Khinskiĭ, P. D. *See* Zhironkin, A. N.
Khodak, L. Z. *See* Bardin, I. P.
Khol, F., spheroidal cast irons, 89
Khorosh, V. A., design of finishing round passes, 229
Khudak, L. Z., and **Yu. A. Popov**, blast-furnace operation with low bulk-density ores, 85
Khudokormova, N. P., controlling gas flows in coal charge during coking, 352
Kidin, I. N., influence of heating velocity on chromium alloyed iron, 492
Kienzle, O., bending sheet metal, 246
Kihl, G., cemented metal carbides, 233
Kik, F. R., sealing of blast-furnace bosh area, 84
Kilburn, M. A. *See* Dean, S. K.
Killens, Ch., polarographic slag analysis, 246
Kimo, T. *See* Koshiba, S.
Kimura, J. *See* Gotô, H.
Kimura, S., quantitative analysis of nitrogen in iron and steel, 380
Kimura, T., and **H. H. Hausner**, powder metallurgy in Japan, 99
Kind, K. *See* Bungardt, K.
King, B. W. *See* Tripp, H. P.
Kipling, R. A., and **N. D. Macdonald**, sintering iron ore at Appleby-Frodingham, 213
Kirby, P. C. *See* Ruffle, T. W.
Kirchhof, S., Söderberg electrodes, 87
Kirkbride, L. D. *See* Philbrook, W. O.
Kirkendall, W. E., cathodic protection at Los Angeles, 494
Kir'yanov, A. K. *See* Esin, O. A.
Kishkin, S. T. *See* Bokshteĭn, S. Z.
Kislyakova, E. N., sensitivity of technical dilatometer, 371
Kissel, R. *See* Husson, G.
Klaban, J. *See* Plešinger, A. M.
Klein, U., and **K. Roesch**, graphitization of whiteheart malleable cast iron, 89
Kleinschmidt, W. W. *See* Todd, F. C.
Klempt, W., and **G. Huck**, removal of hydrogen sulphide from coke-oven gas, 215
Kleppe, S. R. *See* Feely, F. J.
Klimenko, V. M. *See* Chekmarev, A. P.
Klinefelter, C., vacuum metallizing, 236
Klyachko, Yu. A., A. G. Atlasov and **Yu. D. Labut'ev**, determination of hydrogen in cast iron, 244
Knab, H. F., furnace for water-shipped assemblies, 225
Knacke, O. *See* Dahlke, O.
Knapp, R. T., mechanics and damage potential of fixed type cavities, 493
Kniaginin, G., open risers for steel castings, 358
Knight, J. R., and **E. C. Rhodes**, alloys of iron with palladium and platinum, 105
Knight, L. B., automation in low-tonnage shops, 92
Knoche, H., hardening plants, 94
Knotek, M. *See* Pobořil, F.
Knox, R., jun., air as nitriding gas, 227
Knüppel, H., and **H. J. Kopineck**, determination of P using radioactive isotopes, 491
Knyazev, M. I. *See* Arshinov, F. L.
Kobayashi, S., steel forging process in Japan, 228
Kobrin, M. M., stability of residual stresses during cyclic loading, 239
Kocakevitch, P., foaming and metallic emulsions in slags, 86
Koch, A. H., furnace costs, 93
Koch, M. *See* Wiegand, H.
Koch, W., deoxidation and inclusions, 357
Kochendörfer, A., creep fracture of Mo steel and Cu, 485; dislocations and condensation of vacancies, 485
Kochendörfer, A., and **H.-G. Müller**, effect of elastic strain on formation of martensite, 376
Koehler, J. S., electrical properties of metals, 373; velocity of dislocations, 102; *see also* Seitz, F.
Koehler, J. S., and **F. Seitz**, radiation dissarrangement of crystals, 374
Koelzer, H., heat-treatment and machinability, 233; *see also* Opitz, H.
Koenig, R. F., and **E. G. Brush**, heat transfer in nuclear reactors, 381
Koerfer, E. *See* Görlich, H.-K.
Koerfer, E., H. Schenck, and **H.-K. Görlich**, machinability of unalloyed steel, 478
Kofler, F. M., steel recuperators for pusher-type furnaces, 82
Kogan, L. I., and **R. I. Entin**, intermediate transformation of supercooled austenite, 376
Kohler, K., thermal dilatation and contraction of polycrystalline sintered powder bodies, 237
Köhler, W., electrical extensometer for mechanical testing of materials, 100
Kohn, A., and **G. Delbart**, Jominy test, 488
Koksharov, K. A., coarse-grained structure in medium-carbon steel sheet, 375
Kolev, K. S., determination of residual stresses, 368
Kolosov, M. I., I. Ya. Aizenshtok, N. V. Keis, and **D. B. Royak**, quality of ball-bearing steel, 356
Koltunov, P. S., standard for checking sensitivity of radiography, 101
Komarovskiĭ, A. G., local analysis of welds, 495
Komkov, A. I. *See* Frank-Kamenetskiĭ, V. A.
Konishi, I., M. Kawamoto, H. Miki, M. Adachi, B. Kundo, J. Takamura, Y. Niwa, and **H. Goto**, fatigued railway rails, 240
Kôno, T. *See* Masumoto, H.
Konovalova, T. S. *See* Dubrov, N. F.
Kooistra, L. F., simulated service testing, 487
Kool, G., barrel grinding and polishing of metal parts, 98
Kootstra, N. A. S. J., continuous thickness-tolerance measurement, 231
Kopineck, H. J. *See* Knüppel, H.
Kopp, H., and **E. Zindel**, photometric research for cast iron and steel, 494
Koppe, H., coke consumption schedules for cupolas, 223
Köppen, N. *See* Eitel, W.
Kora, Y., refractories, 83
Korber, J., small scale steelmaking, 471
Kornev, Yu. V., radioactive isotopes in metallurgy, 246
Kornfeld, H., notch toughness-temperature curves, 101; *see also* Hartleif, G.
Kornilov, I. I., creep of solid solution and compounds, 485; solubilities of chemical elements in Ti, 491
Kornilov, I. I., and **V. V. Kosmodem'yanskiĭ**, relationship between composition, temperature and heat resistance, 371
Korolev, A. A. *See* Tselikov, A. I.
Korotkov, A. I., mechanized production of shell moulds, 91
Korzh, P. D. *See* Kozlova, A. V.
Koshergin, S. M., and **N. N. Terpilovskiĭ**, electrodeposition of metals, 365
Koshiba, S., and **T. Kimo**, effects of elements on Ni–Cr–Co steel, 242
Koshiya, K., and **H. Shimizu**, large batch-type reheating furnaces, 93
Kosmider, H., use of oxygen for acceleration of refining in steelmaking, 218; use of oxygen in oxidizing process, 86; *see also* Coheur, P.
Kosmodem'yanskiĭ, V. V. *See* Kornilov, I. I.
Kossel, W., crystal growth, 105
Kossovskiĭ, L. D. *See* Ipatov, N. K.
Kostelac, J. *See* Boening, E. F.
Köster, W. *See* Gebhardt, E.
Köster, W., and **H. Schmid**, Fe–Co–V system, 377
Kotsch, J. A., and **H. W. Peth**, automatic steam generation, 352
Koula, R., casting in permanent moulds, 91
Kowalczyk, L. S., thermal conductivity, 101
Kowalski, F., multi-hole wire-drawing machines, 475
Kowalski, O., tensile strength in wire drawing, 368
Kozhevnikov, I. Yu. *See* Osipov, A. I.
Kozina, A., production of Thomas slags in Talbot furnaces, 87
Kozlova, A. V., and **P. D. Korzh**, spectrographic analysis of alloys, 495
Krafft, J. M., delayed yielding of mild steel, 101; transient strain fluctuations in longitudinal impact of bars, 484
Kraft, E. *See* Grüner, P.
Krainer, H., alloy-steel industry, research methods, 104; stabilization of permanent magnets, 370; welding austenitic chrome–nickel steels, 477

Kramer, H., blast furnace refractories, 83
Kramer, I. D., frozen-mercury patterns, 224
Kramer, W., properties of blast-furnace cements, 85
Kramnik, T. A., and **N. I. Nechesova**, speed of sintering, 466
Krashchin, M. D. *See* Krushchov, M. M.
Krasnichenko, L. V., and **A. A. Tikhonov**, strength of adhesion of a metallized layer with base, 479
Krath, E. *See* Zörner, A.
Kraus, G. *See* Hendus, H.
Kraus, R., chemical analysis of iron and steel, 494
Krauze, G. N., type 1150 Soviet blooming mill, 475
Kreutzer, C., basic furnace roofs, 469
Krhůt, V. *See* Nečas, O.
Krisch, A., hardening in deep-drawing tests, 484
Krisch, A., and **H.-J. Wiester**, creep testing of Cr–Ni–Mo steels, 105
Krisement, O., and **F. Wever**, bainite reaction in high-carbon steels, 375
Krishnan, A. A., and **B. Halder**, sintered steel powder compacts, 366
Krishnan, M. S., chromite, 351
Kritskaya, V. K. *See* Il'ina, V. A.
Krivobok, V. N., and **C. R. Mayne**, forming and bending at sub-zero temperatures, 485
Krivulya, G. D. *See* Garger, K. S.
Kroh, O., occupational diseases, 383
Kronmarck, S., metallurgical processes in basic open-hearth furnace, 87
Krotov, I. V., corrosion of iron powders, 492
Krüger, O., defects in enamelling of steel, 237
Kruithof, A. M., furnace temperature measurement, 354, 467
Krummell, H. D., and **J. R. Hicks**, lubrication practices with metal powder bearings, 100
Krupitskii, B. A. *See* Tsvibel, V. N.
Krupkowski, A., and **A. Piotrowski**, microsegregation in metals, 490
Kruse, J. E., heat-treatment of pearlitic malleable cast iron, 89
Krusenstjern, A. V., and **H. Schlegel**, deformation in chemical polishing, 234
Krushchov, M. M., E. S. Berkovich, M. D. Krashchin, K. A. Krylov, and **A. V. Andreeva**, micro-hardness of engine cylinder, 488
Krushchov, M. M., and **A. A. Sorpko-Novitskaya**, resistance to abrasive wear of carbon steels, 488
Kryanin, I. R., welding properties of high strength cast steel, 477
Krylov, K. A. *See* Krushchov, M. M.
Krynicky, P., excessive oxidation of iron in Bessemer converter, 218
Kubasov, V. A., attachments to IM–12A machine for high-temperature tensile and bend tests, 484
Kuczynski, G. C., and **I. Zaplatynskyj**, density distribution in metal powder compacts, 481
Kudelya, E. S., and **A. S. Dem'yanchuk**, spectrochemical determination of C in iron alloys, 491
Kuemmel, D. F. *See* Wrangell, L. J.
Kuhlmann-Wilsdorf, D. *See* Wilsdorf, H.
Kühn, P. *See* Myslivec, T.
Kuhn, V., colorimetric analysis of cast irons, 244
Kühne, H., additional oil firing in cupola, 222
Kühnert, A., hardening of high-speed tool steels, 94
Kuhnlein, R. F., scrap preparation and contamination, 355
Kuka, K. S., hoist-control systems, 363
Kulikov, I. S., theory of slags, 221
Kulikov, V. O., and **I. I. Bornatskii**, fettling new hearth on open-hearth furnace, 83
Kulishenko, A. Z., and **K. P. Medvedev**, thermochemical transformations of S compounds in coal during coking, 353
Kulman, F. E., protection of pipe-type cables, 108
Kumada, K. *See* Imai, Y.
Kunakov, N. E., blast-furnace operation at elevated pressure, 85
Kundo, B. *See* Konishi, I.
Kunin, R. *See* Horner, C.
Küntscher, W., hardening, stabilizing, and annealing, 228
Kunze, E. *See* Bungardt, K.
Kuo, K. *Paper*: "Alloy Carbides Precipitated during the Fourth Stage of Tempering", 258; *Paper*: "Metallography of Delta Ferrite". *Discussion*, 57. *Correspondence*, 60. *Author's Reply*, 61; carbide phase changes on tempering Mo steel, 377; intermediate phase in burnt tungsten steels, 105
Küpper, K., costing in ferrous industry, 111
Kura, J. G. *See* Grube, K. R.
Kurdyumov, G., and **L. Lysak**, decomposition of martensite, 106
Kurtepov, M. M. installation for corrosion tests, 492
Kurz, P. F. *See* Levy, A.
Kushpel', V. S., cost calculations in open-hearth plant, 356
Kuster, E. C., corrosion preventives, 378; *see also* Cox, A. B.
Kustov, B. I., coke-oven chamber width, 352
Kutzelnigg, A., accelerated climatic tests, 107
Kuzmin, A. D., M. V. Vasilchikov, and **M. V. Barbarich**, hot-rolled gear wheels, 476
Kuznetsov, A. N. *See* Roiter, V. A.
Kuznetsov, R. A., defects of hydraulic universal testing machine, 239
Kvyatkoskii, V. V., recovering metal from slag, 469
Kyotani, M. *See* Iwase, K.
Kyrklund, R., metal finishing in Finland, 99

Labut'ev, Yu. D. *See* Klyachko, Yu. A.
Lacombe, P. *See* Cizeron, G.
Lafon, J. E., burners for high-speed combustion, 467
Lagerberg, G., and **Å. Josefsson**, behaviour of carbon and nitrogen in α-iron, 102
Lagowski, J. *See* Rulfs, C. L.
Lake, A. *See* Weinberg, M.
Lakey, J. R. A., and **W. Bostock**, electroprecipitation, 354
Lamb, W. W., and **W. F. Carn**, investment casting alloys, 222
Lambert, J. W., residual-stress equations, 483
Lambert, R., surface hardening of steel parts, 227
La Motte Grover, structural welding, 477
Lamprecht, M. W., upset forgings, 474
Lamure, J., and **P. de Gelis**, determination of total S in minerals and slags, 495
Land, T., and **R. Barber**, *Paper*: "Suction Pyrometers in Theory and Practice," 269
Landeen, S. A. *See* Goranson, R. W.
Landers, W. S. *See* Parry, V. F.
Landi, M. F. *See* Braicovich, L.
Landsman, H. J., and **A. T. Lattauzeo**, induction heating in shell forging, 362
Lane, K. F., recurring failures in steelworks, 88
Lane, P. H. R. *See* Ross, N.
Lang, C. *See* Gledhill, P. K.
Lang, C., and **J. M. Ridgion**, *Paper*: "The Reproducibility of Test Results in an Experimental Sinter Box", 172
Lang, E. C., gas analysers, 495
Lang, G., X-ray spectral analysis, 242
Lange, H. *See* Schmiedel, W.
Lanquetin, transport for cropped ends, 363
Lansing, J. H., heat-treating for malleable iron, 224
Lapshova, M. P. *See* Efimov, V. A.
La Que, F. L., corrosion tests, 377
Large, H. E., heat-resistant alloys, 357
Larsen, W. L. *See* Gleiser, M.
Larson, R. K., reel drive selection, 229
Lattauzeo, A. T. *See* Landsman, H. J.
Laue, K., tool problems in extrusion process, 94
Laureys, J., J. Van Muylder, and **M. Pourbaix**, magnetic water treatment apparatus, 108
Laurie, H. A. *See* Bell, J. F.
Lavender, B. E. P., modern forging presses, 200
Lawrie, W. B., low volume high velocity exhaust system, 471
Lawson, J. V. *See* Pollard, W. R.
Lawther, L., automatic heat control of gas-fired industrial furnaces, 473
Layton, R. E. *See* Gravenstreter, P. R.
Lazarenko, S. P., IM–12A testing machine, 484
Lazarus, D., metallic diffusion, 373
Lazzerini, R., synthetic resins for thermal insulation, 83
Leach, C. B., E. L. Windeler, and **R. F. Sanders**, production-design teamwork in foundry, 92
Leak, D. A., W. R. Thomas, and **G. M. Leak**, diffusion and solubility of N in Si iron, 106
Leak, G. M., solubility of carbon and nitrogen, 54; *see also* Leak, D. A.; Thomas, W. R.
Leake, L. E. *See* Turkdogan, E. T.
Lebedeva, F. B. *See* Zaslavskii, Yu. S.
Le Boucher, B., wet corrosion, 108
Leckie, A. H., fuel efficiency of blast furnace, 216
Leckington, N. A. *See* Samuel, R. L.
Ledford, R. F., treatment of metal finishing wastes, 365
Ledford, R. F., and **L. O. Gilbert**, filtering of chromic acid solutions, 479
Lee, A. M. *See* Jones, H. G.
Lees, B., blockage and corrosion of air heaters, 352
Leeser, D. O., and **R. A. Daane**, residual stresses in electropolishing, 483
Lefranc, J., physico-chemical principles of enamelling sheet iron and steel, 366
Lefranc, L., titanium in enamelling, 366
Legat, A., and **A. Nöstelhaller**, hardening of structural steels, 227
Legendre, M., P. Michaux, and **P. Thierry**, results of using Carling coke in blast furnace, 215
Legget, R. F. *See* Baracos, A.
Lehmann, G. *See* Kellermann, K.
Lehmann, W. *See* Potzold, G.
Leigh, F. S., induction melting, 87; mains frequency coreless induction melting furnace, 471
Leland, J. F., and **J. W. Helms**, cold extrusion and lubrication, 229
Lemanceau, B. *See* Joussot-Dubien, J.
Le May, R. C., flame geometry, 352
Lenel, K. R., fuel statistics, 214
Lenk, W. *See* Boeckhaus, K.
Lenke, A., pattern construction, 225
Leonard, L. *See* Cohen, J.
Leone, W. C., distribution of shear-zone heat in metal cutting, 233
Leporskii, V. V., and **V. A. Tyagus**, tilting open-hearth furnaces, 218
Lepp, H., obituary, 462
Lerner, R. Z., conference on construction of large-capacity coke ovens, 214
Leroy, P., regularity of melt in Thomas operation, 87; *see also* Trentini, B.
Leroy, P., and **D. Menendez**, prerefining high silicon iron with pure oxygen in ladle, 220
Leroy, P., B. Trentini, and **E. Devernay**, basic Bessemer steel with low non-metal content, 218

Leroy, P. J., acid Bessemer process, 441
Leroy, P. J., J. G. Galey, and F. B. Cawley, *Paper*: "Control in The Acid Bessemer Process". *Discussion*, 438. *Correspondence*, 441. *Author's Reply*, 441, 442
Lesar, A. R., and T. D. McGee, abrasion of fireclay refractories, 468
Leshchinskii, M. F. *See* Levin, M. Z.
Leslie, F. B., analysing furnace atmospheres, 495
Lesnewich, A., electrode activation for metal-arc welding, 97
Lesnikova, E. N., spectrographic analysis of slags, 381
Lester, W. J., and G. W. Prescott, temper brittleness of 1% Cr–½% Mo weld metal, 232
Leszynski, S. W., strain gauge applicator, 487
Leven, M. M., stress gradients in grooved bars and shafts, 484
Leventsev, N. P., and A. M. Samarin, influence of P on O_2 solubility in molten Fe–Cr and Fe–Ni alloys, 219
Levi, R., sheet steel, 476
Levin, E. E. *See* Skvortsov, G. E.
Levin, I. A., tendency of stainless steels to intercrystalline corrosion, 493
Levin, M. Z., M. F. Leshchinskii, K. D. Shumilov, and V. K. Prourzin, determination of pressure of metal on rolls, 475
Levinsohn, N. *See* Sanders, C. A.
Levitan, M. M., graphical-analytical treatment of dilatometric curves, 242
Levoy, L. G., kilovar, kilowatt and voltage control, 231
Levy, A., and P. F. Kurz, carbon monoxide–hydrocarbon–air flames, 81
Lewicki, W., hydrodynamic lubrication in parallel sliding, 96
Lewis, D. G., corrosion of heating and ventilating appliances, 493
Lewis, G. E., external corrosion of gas mains, 377
Lewis, J. E., Sendzimir reversing mill, 230
Lewis, J. T., modern forging presses, 205; *see also* Elkan, R. M. L.
Lewis, K. G., manufacture of small drop forgings, 362
Lewis, P. W. *See* Burnett, G. E.
Lewis, R. W., jun., *See* Johnson, R. F.
Leyda, W. E., creep-rupture testing, 487
Lianis, G., and H. Ford, cold-rolling, 363
Liberman, L. Ya., rupture tests on metals, 239
Libsch, J. F. *See* Griest, A. J.; Hall, R. C.
Lichtman, D., temperature-indicating material for weld inspection, 96
Liebhafsky, H. A. *See* Simons, E. L.
Liekmeier, continuous strand-annealing and galvanizing installation for steel wires, 365
Liekmeier, F., sigma-steels for prestressed concrete, 496
Liger, J., drum polishing, 365
Lihl, F., and E. Buhl, cadmium alloys, 107
Lihl, F., and P. Zemsch, cold rolling properties of transformer steels, 229; hysteresis loss in hot-rolled transformer sheet, 241
Lillieqvist, G. A., obituary, 349
Lindahl, U., design aspects of foundry buildings, 358
Lindblom, Y., and S. E. Dahlgren, hydrogen permeability of steel, 237
Lindemann, H. *See* Wegner, U.
Linder, F., and H. Weidermann, revolving cylindrical bloomery furnaces, 473
Lindop, T. C., modern forging presses, 202
Linford, A., instrumention in disposal of finishing wastes, 99
Linford, H. B., and P. E. Grubb, cleanability and oil spreading rates, 233
Lintschewski, B. W., and N. P. Shuk, oxidation mechanism of iron, 492
Lipinskikh, B. M. *See* Esin, O. A.
Lismer, R. E., and F. B. Pickering, *Paper*: "Microscopical Examination of Samples of Iron containing Siliceous Inclusions." *Discussion*, 62. *Author's Reply*, 63
Littmann, M. F. *See* Ward, C. E.
Litvinova, E. I., passivation of alloy steel in sulphuric acid solutions, 365
Liu, C. K. *See* D'Agostino, J.
Livadefs, C. J., *Paper*: "The Structural Iron of the Parthenon". *Correspondence*, 408. *Author's Reply*, 409
Livshits, G. L. *See* Pridantsev, M. V.
Lizaur, R. Guevara, steel for welded structures, 364
Lloyd, E. C., obituary, 462
Lloyd, J. L., and A. W. Wolfendale, scattering of μ-mesons in lead and iron, 246
Lloyd, J. R. B., dust extraction on pneumatic chisel, 471
Locke, C., application of indirect chills, 92; test patterns for evaluation of sand mixtures, 224
Loebbecke, E., hot-blast cupola melting technique in Europe, 470
Loewen, E. G., and N. H. Cook, metal cutting measurements, 476
Loewen, E. G., and M. C. Shaw, analysis of cutting-tool temperatures, 233
Loison, R., dry cake coking, 215
Loison, R., and A. F. Boyer, cracking of coke, 352
Lomas, J., cast steels, 224; sintering powdered metals, 99; stainless and heat-resisting steels, 357
Lominac, H. R. *See* Bell, W. C.
Loncaric, R. *See* Greenwell, H. E.
Long, J. V., and G. D. Cremer, all-metal honeycomb sandwich structures, 246
Lonskii, E. D., influence of Mn on mechanical properties of welds, 364
Lorant, M., shielded-arc welding of pressure piping, 478
Loria, E. A., hot work die steels, 381
Lorking, K. F., corrosion of iron in soils, 378
Lovett, M., effluent disposal in chemical industry, 383
Lowe, E. J., obituary, 462
Lowen, J., and A. L. Carney, determination of Zn in presence of Fe and Ni, 381
Lowenheim, F. A., tin-zinc plating, 365
Lowenheim, F. A., and R. T. Gore, alloy plating, 235
Lowenstein-Lom, W., gasification of solid and liquid fuels, 467
Lozinskii, M. G., and S. G. Fedotov, hardness of pure metals during heating, 240–241
Luce, W. A., stainless steels, 357
Lüdemann, K., steel production in German Democratic Republic, 355
Lüdenskii, I. M., and Ya. S. Finkel'shtein setting piercing mills, 363
Lueg, W. *See* Fink, K.
Lunev, A. A., cast copper anti-frictional steels, 103
Lupibereza, T., clay deposits of Arandelovac Basin, 354
Lutter, E., bright copper plating, 480
Luvisi, W., foundry ladle practice for acid steel, 90
Lysaght, V. E., Rockwell hardness testing, 487
Lysak, L. *See* Kurdyumov, G.
Lyulichev, A. N., and L. S. Palatnik, temperature of sparks in metal hardening apparatus, 361

McAfee, J., heat-treatment, 473
Macalla, J., industrial television in steel industry, 367
McCallum, H. G., cupola charging, 223
McClintock, F. A., minimum scatter in fatigue testing, 101; size and shape effects in fatigue, 103
McCormick, G. C., mechanized continuous furnaces, 225
McCracken, J., controlled charging of basic open-hearth furnaces, 87
McCreery, L. H. *See* Dietz, J.
McDaniel, G. R., and R. S. Haught, ladle practice for acid steel, 90
Macdonald, N. D. *See* Kipling, R. A.
MacDonald, R., history of Fontana blooming mill, 475
McDowell, B. L. *See* Schweitzer, G. K.
McFarland, F. *See* Vandeventer, R. E.
McGee, T. D. *See* Lesar, A. R.
McGonnagle, W. J., J. H. Monaweck, and W. G. Marburger, bond testing, 370
McHenry, W. D. *See* Gilbert, L. O.
Macherauch, E. *See* Binder, F.
Machin, J. S. *See* Yee, T. B.
McInerney, M. J., G. R. Mattocks, and M. P. Newby, oil burners for O.H. furnaces, 360
McIntosh, A. B., and K. Q. Bagley, canning materials for reactors, 111
McIntyre, J. B., moulding machines, 91
McKechnie, R. K. *See* Moore, W. F.
MacKinnon, J. M., Pilger mill, 230
Mackowsky, M. Th., assessment of quality of metallurgical coke, 215
McLachlan, M. J. *See* Bell, J. F.
McLean, D., crystal slip and grain-boundary sliding in creep, 485
McLennan, J. E. *See* Allen, N. P.
McMahan, J. S., sintering plant at Steel Co. of Canada, 213
McMeans, G. B., oxygen converter process, 218
McMillan, J., dynamics of process plant, 482
McMillan, W. R. and E. A. Gulbransen, high-vacuum furnaces and heat-treating atmospheres, 359; *see also* Gulbransen, E. A.
McNabb, J. S., manganese exploration in Philipsburg district, 80
McPherson, D. J. *See* Domagala, R. F.
Madsen, I. E., coke and by-products in 1954, 352; developments in iron and steel industry, 468
Maeder, E. G., differential annealing, 227
Maekawa, S., and Y. Nakagawa, corrosion of pouring-pit refractories 83, 215; non-metallic inclusions, 472
Magers, W., carbon dioxide in moulding sand, 359
Magie, W. A., and W. C. Bryant, lubricants for steel plant, 96
Magnusson, N. H., reaction skarn in iron ores of Central Sweden, 351
Mahr, C. *See* Denck, W.
Maia, S., electric overhead travelling cranes, 231
Majors, H., jun., influence of fluid pressure on strain gauges, 487
Majumdar, A. K., and S. Banerjee, estimation of silica, 246
Majumder, B. L., zircon as refractory material, 216
Makarov, A. N. *See* Bogachev, A. M.
Makrides, A. C., and N. Hackerman, effect of thiourea compounds on dissolution rate of iron and mild steel, 494
Malát, M. *See* Suk, V.
Malherbe, M., production of coke and gas in Bassin du Nord and Pas-de-Calais areas, 214
Malinkina, E. I., high-speed steel tools from castings, 88
Mallett, M. W. *See* Griffith, C. B.
Malmberg, G., testing mild steel for welding, 239
Malmberg, W., induction surface hardening of spheroidal graphite cast iron, 473
Malyshev, V. N. *See* Petrichenko, A. M.
Manchenko, G. S. *See* Chernov, N. N.
Mándy, T. *See* Vendl, A.
Manning, E. G. *See* Bell, W. C.
Mansell, S. J. *See* Marshall, L.
Marburger, W. G. *See* McGonnagle, W. J.
Marcovitch, I. W., non-oxidizing heat test for plating adhesion, 235
Marinček, B., desulphurization of iron in electric smelting furnace, 217; melting furnaces for iron foundry, 223; pig-iron production in electric smelting furnaces, 85
Marion, F. *See* Aubry, J.

Marion, M. F., ferrous oxide, 379
Marizy, surface defects in steels, 102
Mark, J. W., and **W. Goldsmith**, barium titanate strain gauges, 487
Markon, L. O. *See* Geguzin, Ya. E.
Markovic, T., cathode protection of buried metals, 107
Markovic, T., M. Karsulin, Z. Dugi, and **D. Zagar**, corrosion reaction for buried iron, 107
Marsden, B. *See* Joyce, D.
Marshakov, I. K. *See* Rozenfel'd, I. L.
Marshall, D., thermal expansion of metals, 102
Marshall, L., and **S. J. Mansell**, frictional resistance and wear of steel, 477
Marshall, P. W. *See* Dulis, E. J.
Marshall, R. H., hardenability of carbo-nitrided carbon steel, 103
Marshall, T., and **D. S. Nicholson**, electric smelting of titaniferous ironsands at Onekaka, 217
Marti, F. Burriel, and **M. Cruz Serna**, polarographic determination of V in steels, 381
Martin, M. L. *See* Nicolas, P. J.
Martin, S. D., production standards in foundry industry, 357
Martin, W., and **E. Thon**, electric hot-topping, 88
Martin, Z. Garcia, fatigue in welded components, 232
Martinez, F. Delicado, chemical analysis of titaniferous slags, 495
Masing, G., equilibrium diagram and reactions in solid state, 491
Masreliez, L., Swedish steel consumption and distribution, 496
Massimilla, L. *See* Giannone, A.
Massimilla, L., and **S. Bracale**, behaviour of refractory materials to thermal stresses, 215
Massin, M., cold rolling, 230
Massinon, J., tars for tar-dolomite mixtures, 467
Masumoto, H., H. Saitô and **T. Kôno**, influence of Ni on alloys of Co, Fe, and Cr, 488
Masumoto, H., H. Saito, and **Y. Sugai**, influence of additions of nickel, 242, 488
Matheson, A. F., St. John Del Rey Mining Co., Ltd., Brazil, 80
Mathiot, H., control in modern rolling mills, 230
Matlock, H., and **S. A. Thompson**, creep in bonded electric strain gauges, 485
Matsuoka, J., application of K.R.K. process in steel wire mill, 364; *see also* Iwase, K.
Mattocks, G. R. *See* McInerney, M. J.
Matulis, Yu. Yu. and **A. I. Bodnevas**, cathode polarization in deposition of metals, 365
Matuyama, E., growth of graphite in grown cast iron, 223
Maurer, K. L. *See* Mitsche, R.
Maurer, R., vacancies and alkali halide crystals, 373
Mavis, F. T. *See* Peck, C. F., jun.
Mawhinney, M. H., heat transfer in industrial heating furnaces, 473
May, J. T., organization of maintenance in wire industry, 475
Mayne, C. R. *See* Krivobok, V. N.
Mazanec, K., and **A. Kalivoda**, effect of tungsten on nucleation and growth of ferrite, 106
Mazurzak, G. W., energy relations in chemical baths, 480; energy relations in sulphuric acid bath, 479
Medlock, R. S., automatic process control, 482
Medovar, B. I., effect of gases on hot cracking of welds, 364; weld hot cracking, 364
Medvedev, K. P. *See* Kulishenko, A. Z.
Medvedev, K. P., and **V. M. Petropolskaya**, behaviour of S during coking, 353
Meerkamp van Embden, H. J., precision casting, 91
Megaw, R. G. *See* Trant, J. N.
Mehl, C., carbonization of Lorraine coals at Thionville, 214
Mehrkam, Q. D., hot salt quenching, 228
Mehta, P. *See* Bannerjee, A.
Meijering, J. L., diffusion of oxygen through solid iron, 102
Meingast, H. M., hardening plants for motor industry, 93; quench-hardening, 94
Meiswinkel, H., and **V. Seul**, applicability of oxide layers on iron, 366
Melcher, N. B., use of iron and steel scrap in U.S.A., 86
Melchor, J. L. *See* Ayres, W. P.
Mellere, C. *See* Savioli, F.
Mel'nik, B. A. *See* Dashevskiĭ, Ya. V.
Melville, W., modern forging presses, 194, 203, 207
Menendez, D., *See* Leroy, P.
Men'shikov, A. D. *See* Zhironkin, A. N.
Menster, M. *See* Cohn, E. M.
Menuet-Guilbaud, B. *See* Thibaut, Ch. G.
Menzies, C. E. K., obituary, 209
Menzies, K., obituary, 78
Mercier, A., burden preparation for blast furnaces, 81
Merriman, A. D., toxicity of metals, 380
Meschter, E., intensification of radiographs, 488
Meserve, D. R., plastisols: protective coatings, 98
Metzger, A. J., and **F. W. Thompson**, comparison of modulus of rupture values, 83
Meunier, F., and **C. Soisson**, simultaneous desulphurization and deoxidation in basic converter, 218
Meyer, H.-J. *See* Wiegand, H.
Meyer, H. W., physical properties of steel foundry sands, 224
Meyer, K., iron ore pelletizing and sintering, 81
Meyerson, M. R., and **S. J. Rosenberg**, austenite to martensite transformation in SAE 1050 steel, 376
Michael, D. G. *See* Britton, S. C.
Michaud, M., and **G. Husson**, radiation of flames 82
Michaux, P. *See* Legendre, M.
Michel, A., Cr–Mn–Ni stainless steels, 357; martensite transformation, 376; properties of cementite, 490
Michel, E. B. *See* Roehl, E. J.
Michel, F., "Indugas" preheating chamber at Auto-Union, 93
Michie, G. M., sampling and assessment of airborne dust, 471
Michler, K. W., plastic shaping of metals, 228
Michoulier, P., iron and steel sheet production, 366
Middleton, J. M., influence of moulding materials on hot tearing, 224
Migeon, J., estimation of tin in iron and steel products, 381
Mikhailichenko, N. G., measuring deformation during torsion testing, 239
Mikhailov, I. N., O.H. furnace automation at Novo-Tagil', 219
Mikhailov, Yu. N. *See* Tomashov, N. D.
Mikhalev, M. S. *See* Popov, A. A.
Mikhel'son, A. A., centrifugal casting machine, 91
Miki, H. *See* Konishi, I.
Millar, N. S. C., colour stability of "fritted-in" coloured enamels, 237; frit formulation, 236
Miller, E. P., electrostatic coating, 480
Miller, S. *See* Winning, J.
Miller, T. C., $Ca(OH)_2$ in suspension, 229
Miller, W. E., automatic gauge control for cold reduction mill, 230
Mills, T., oxidation of metals, 377
Milner, G. W. C. *See* Ferrett, D. J.
Minc, S., dependence of potential of cathodically polarized electrode on electrolyte structures Pt/HNO_3, steel/HNO_3, 491
Mindler, A. B. *See* Bueltman, C.
Mintrop, R. *See* Vorwerk, O.
Mintrop, R., and **E. Roemer**, wear of blast-furnace refractory lining, 84
Miroschnitschenko, F. W. *See* Averbuch, N. I.
Mishima, T., study of iron and steel in Japan, 482
Mitsche, R., heat-treatment in region of varying temperature, 360; indentation hardness-testing, 487
Mitsche, R., and **K. L. Maurer**, polycrystalline macrohardness of quenched, unalloyed steels, 486
Mitsuhashi, T. *See* Ueno, M.
Mitsuhashi, T., and **K. Tsuya**, hardenability of boron steel, 361
Mitsui, T., iron and steel industry in Japan, 383
Mishima, T., K. Tachikawa, and **T. Oya**, effects of cold work on permanent magnet alloys, 241
Miyakawa, O. *See* Saga, T.
Miyoshi, E., and **K. Kawano**, thickness measurement with 'Sonizon' ultrasonic gauge, 370
Mizuma, K. *See* Nakamura, H.
Mladentseva, I. O. *See* Sukhenko, K. A.
Mochizuki, K., steel tube rolling in Japan, 476
Modráček, O., drawability and mechanical properties of mild steel wires, 237
Moeller, R. W., and **W. A. Snell**, diffused nickel–cadmium as corrosion preventive, 480
Möhl, K., E. Schael, and **J. Bruch**, spectro-analytical installation with voltage control mechanism, 244
Mohler, J. B., electroplating on porous metal, 235; practical throwing power, 98
Moiseev, A. I., and **M. V. Yakutovich**, modulus of normal elasticity, 237
Moiseevich, S. I., formation of hot spots on O.H. furnace supporting girders, 219
Moll, G., graphite electrodes in electric arc furnaces, 220
Molle, R., cold-forming of metal, 94
Möller, H., W. Grimm, and **H. Weeber**, 15 mV betatron, 242
Molotkov, L. F., G. È. Tsukanov, and **E. M. Bortunov**, vertical rolls of universal mill, 475
Molotkov, L. F., V. M. Yuferov, G. È. Tsukanov, E. M. Chernevich, E. M. Bortunov, and **N. G. Sorochan**, mechanical properties of bridge steel, 489
Monaghan, J., a furnace scanning periscope, 48
Monaweck, J. H. *See* McGonnagle, W. J.
Mondon, R. *See* Jacquet, P.
Monkman, F. C., P. E. Price, and **N. J. Grant**, creep rupture properties of 18–8 stainless steels, 103
Monnier, M. *See* Pennac, L.
Montariol, F., purification of metals, 112
Montgomery, J., obituary, 78
Montojo, J. P., alloys rich in Mo and Ni, 357
Moore, D. G. *See* Eubanks, A. G.
Moore, D. G., and **J. R. Cuthill**, Cr–B–Ni cermet coating, 235
Moore, J. H., vacuum melting, 87, 88
Moore, W. F. and **R. K. McKechnie**, deoxidation of vacuum-melted M252, 359
Morávek, O., quenching, alloying, and surface-hardening of grey and malleable cast irons, 223
Moreau, J., and **J. Bardolle**, oxide films on surface of iron, 379
Morgan, A. D., defects in cupola-melted iron, 92
Morgan, E. R., and **D. N. Frey**, vacuum and pressure melting of iron-base alloys, 359
Morgan, E. R., and **V. F. Zackay**, ductile iron-aluminium alloys, 102
Morgan, G. F. J. *See* Emms, S. A. G.
Morgan, J. B. *See* Cline, C. W.
Morgan, J. H., spread of protection, 494
Mori, T. *See* Sawamura, H.

Morioka, S., and **K. Sakaiyama,** anodic behaviour of Fe–Cr alloys in sulphuric acid solution, 380
Morisset, P., quality control of metallic coatings in France, 99
Morita, Z. *See* Adachi, A.
Moritz, W., rectifier-controlled reversing twin-drive mill, 95
Morizot, M., Lorraine steelworks power supply, 82
Moroz, L. M. *See* Bokshteĭn, S. Z.
Morozov, A. N. *See* Shneerov, Ya. A.
Morozov, V. I., slag in mixer, 469
Morrice, E. *See* Engel, A. L.
Morsing, J., technical gas analysis, 381
Mort, J. H., capacity rating of strip mills, 230
Mortara, E. *See* Pensotti, C.
Mortenson, M., and **H. J. Hansen,** impact crushers and beater mills, 81
Moschella, R., ultrasonic impact grinding, 364
Mosel, P. *See* Steffes, M.
Motloch, Z., and **T. Myslivec,** distribution of non-metallic inclusions, 470
Mott, B. W. *See* Haddrell, V. J.
Mott, B. W., and **S. D. Ford,** micro-indentation hardness testing, 486
Mott, N. F., rate-determining process in creep, 485; theory of fracture and fatigue, 102
Mott, R. A., early ironmaking in Sheffield, 382
Mott, R. A., and **H. C. Wilkinson,** determination of sulphur in coal and coke, 245
Moussu, J. *See* Sabatier, J.
Moutot, A., crushing and sizing of blast furnace burden, 84
Muchnick, S. N., adhesive bonding of metals, 478
Muir, A. R., porosity in steel welds, 97
Mukherjee, A. K., resorcylaldoxime as organic reagent, 244
Mülders, O. *See* Bungardt, K.
Müller, A., standard gauge rail traffic in iron industry, 95
Müller, H., bath-nitriding of pressing tools, 227; calculations in hardening plants, 228; surface-hardening, 227
Müller, H.-G. *See* Kochendörfer, A.
Müller, J., nitriding of iron alloys, 361
Muñoz del Corral, F., equilibrium between mixtures of CO and CO_2 and steels, 93; micro-hardness, 486
Münster, A., and **W. Ruppert,** surface layers of Ti compounds, 366
Mura, T. *See* Ueno, M.
Muraca, R. M. *See* Serfass, E. J.
Muranaka, H. *See* Sawamura, H.
Murnaghan, A. R. *See* Bond, R. L.
Murphy, C. D., jun., expendable pattern materials for investment casting, 225
Murphy W. L. *See* Teskey, J. W.
Murray, J. D., biographical note, 349; *see also* Gemmill, M. G.
Mutte, A. *See* Pennac, L.
Myhill, A. R., total gasification of coal in Great Britain, 215
Mylenas, C., composite models for cemented joints, 364
Mylonas, C. *See* D'Agostino, J.
Myskowski, E. T. *See* Bishop, H. F.
Myskowski, E. T., and **H. F. Bishop,** application of chills for neutralization of rib and boss hot spots, 92
Myslivec, T. *See* Motloch, Z.
Myslivec, T., and **S. Hořejš,** faults in railway-wheel tyres, 242
Myslivec, T., A. Walecsek, and **P. Kühn,** basic Bessemer slags, 88

Nadeninskaya, E. P., wear of cutting tool, 233
Nagami, K. *See* Yama, S.
Nagashima, K., N. Oda, T. Nonaka, E. Funaki, and **K. Nishioka,** rotating-bending fatigue testing machine, 482
Naidich, Yu. V. *See* Permyakov, V. G.
Nakagawa, Y. *See* Maekawa, S.
Nakamura, H. *See* Nishihara, T.
Nakamura, H., and **K. Mizuma,** induction hardening and fatigue strength, 483
Nakano, Y. *See* Ueno, M.
Nalimov, V. V. *See* Genshaft, S. A.; Ionova, K. I.
Narashimhan, V., magneto-elasticity of polycrystalline iron and nickel, 238
Narayan, S. N. Anant, and **S. Visvanathan,** production of nodular cast iron, 222
Nass, C. V., mechanization for small foundries, 357
Natanson, A. K. *See* Elyutin, V. P.
Naumann, F., applications of mill casting to grey and malleable iron, 92
Navarro, J., and **H. F. Taylor,** inorganic binders in shell moulding, 472
Nečas, O., and **V. Krhút,** cast-iron rolls for rolling mills, 89
Nechesova, N. I. *See* Krannik, T. A.
Nedovizii, I. N., and **A. L. Tarnaviskii,** pickling baths of marshalite, 365
Needham, A. B., and **W. R. Storms,** manganese exploration in Arizona, 80
Neff, H., micro-radiographic investigations on high-speed steel, 104
Nehrenberg, A. E., delta-ferrite, 60
Nekrasov, S. G., design of round passes, 229
Nelson, J. B., differential thermal analysis, 352
Nemet, A., and **W. F. Cox,** industrial radiology, 242
Nenno, S. *See* Tagaya, M.
Nepper, M. *See* Delsa, A.
Nesbitt, L. C., welding of high-temperature high-pressure piping, 478
Nesterenko, L. I. *See* Aronov, S. G.
Neumaier, B. W., and **C. M. Schillmoller,** hydrogen blistering, 494
Neumann, F.-W., and **D. Hancke,** tube drawing, 229
Neumeyer, M., mechanized batch-type furnaces, 225
Newby, M. P. *See* McInerney, M. J.
Newitt, D. M., properties of matter at high pressure, 489
Neyasov, A. G. *See* Bannykh, A. M.
Nezdoĭmin, I. K., and **A. Ya. Glikson,** coreless induction furnace, 470
Nichols, R. W., *Paper:* "The Hardness of some Carbon and Low-Alloy Steels at Low Temperatures". *Discussion,* 452. *Author's Reply,* 455; *Paper:* "The Mechanical Properties of Carbon Steel Wire at Low Temperatures". *Discussion,* 452. *Author's Reply,* 455; *see also* Hall, H. F.
Nicholson, D. S. *See* Marshall, T.
Nicholson, F., electricity for hot-topping, 221
Nicholson, O. P., refractories, 467
Nicolas, P. J., and **M. L. Martin,** testing air-cleaning equipment in French foundries, 471
Nicolau, P., science in mechanical production, 111
Nielsen, E. H., melting malleable iron, 471
Nielsen, J. P., grain boundary migration, 367
Nieth, F., de-rusting and de-scaling processes, 234; *see also* Wiegand, H.
Nikiforova, E. F., spectrographic determination of arsenic in steel, 491
Nikitin, Yu. P. *See* Popel, S. I.
Nikitina, O. I., spectrochemical analysis of O.H. slags, 381; spectrographic observation of distribution of arsenic in steel, 495
Nikitina, O. N., spectrographic determination of some elements in quartz and high silica materials, 495
Nikitskaya, V. A., fracture structure of steel M16C, 484
Nilova, I. S. *See* Shvarts, D. M.
Nils, J. *See* Delsa, A.
Nippes, E. F., W. F. Savage, and **S. M. Robelotto,** measurement of shunting currents, 97
Nirmaier, E. A. *See* Wagstaff, J. B.
Nisbet, J. D., vacuum metallurgy, 359
Nishihara, T., M. Kakuzen, and **H. Nakamura,** wire drawing, 362
Nishioka, K. *See* Nagashima, K.
Nishizawa, T. *See* Sato, T.
Nisino, K. *See* Endoh, M.
Niwa, K., and **Y. Katsufuji,** decarburization reaction of molten Fe–C alloys, 355
Niwa, Y. *See* Konishi, I.
Nixon, W. C., X-ray microscopy, 104
Noll, D. E., feeding chemicals to boilers, 244
Nonaka, T. *See* Nagashima, K.
Nonhebel, G. *See* Hawkins, J. E.
Norman, A. J., Queensland coals, 352
Northcott, L., ingot structure, 450, 451; solidification of steel, 447
Northcott, L., and **H. G. Baron,** *Paper:* "The Craze-Cracking of Metals", 385
Northup, M. S. *See* Feely, F. J.
Norton, J. T., interaction between metals and atmospheres during sintering, 481
Noshchenko, A. E., spectrographic analysis of magnesite in O.H. furnaces, 495
Nöstelhaller, A. *See* Legat, A.
Nowick, A. S., recovery phenomena in cold-worked metals, 106
Nowotny, H., structure of hard materials, 377
Nutting, J. *See* Hyam, E. D.

Obata, R. *See* Oki, S.
Obelode, G. *See* Görlich, H.-K.
Ochel, W., energy-linked coal and steel industry, 469
Ochiai, O. *See* Hasegawa, T.
O'Connor, D. T. *See* Polansky, D.
Oda, N. *See* Nagashima, K.
Odazima, H., and **Y. Kawamoto,** binderless-dolomite furnace building of basic electric arc furnace, 220
Odekerken, J., electroplating in Holland, 99
Odile, L., coke plant equipment at Neuves-Maisons, 214
Oding, I. A. *See* Ivanova, V. S.
Oehler, H. H., forging furnace, 93
Oehler, J. F., steel plant equipment, 231
Oelsen, O. *See* Oelsen, W.
Oelsen, W., thermodynamic analysis, 237; *see also* Bungardt, K.; Trömel, G.
Oelsen, W., and **G. Heynert,** reactions between Fe–Mn melts and molten aluminates, 220
Oelsen, W., K. H. Risekamp, and **O. Oelsen,** thermodynamic analysis, 372
Oelsen, W., K. Roesch, and **K. Orths,** effect of carbon in foundry pig iron, 92
Ogawa, S. *See* Asanuma, M.
Ogilvie, R. *See* Cohen, J.
Ohtani, N. *See* Endo, H.
Oka, Y., and **S. Ayusawa,** determination of Co in steel, 110
Okada, M., and **M. Watanabe,** application of low temperature stress relieving to penstocks, 97
Okami, M. *See* Kawabata, S.
Okamoto, M., C. Simonura, and **T. Tottori,** influence of carburizing methods on malleable cast irons, 472
Okamoto, M., and **R. Yoda,** behaviour of Mg in spheroidal graphite iron, 491
Okamoto, T., drawing of steel tubes, 229
Oki, S., and **R. Obata,** brittleness of normalized cast steel, 486
Okinaka, Y., and **T. Kato,** gas analysis absorbents for CO, 245
Okladek, J., oxy-acetylene and oxy-propane, 477
Okubo, S. *See* Durelli, A. J.
Olesin, G. A. *See* Robustov, A. M.
Oliva, R., Demag-AEG electric furnace at Barcelona, 220
Oliva, V. Gomez, moulding and casting winding drums for cables, 472
Oliverius, V., casting piston rings, 89
Olivier, R., passivity of Fe–Cr alloys, 380

Olmstead, C. F., batch-type strip annealing furnaces, 227
Olson, R., shell cores, 359
Olson, R. L., stopping blow-by in core boxes, 91
O'Neill, H. *See* Williams, G. H.
Onishi, S. *See* Akimoto, T.
Onitsch-Modl, E.-M., carbide formation, 367
Ono, K., and **R. Sasaki,** effect of inclusions and Mo on Cr steel, 242
Onuma, A. *See* Gotô, H.
Oomura, T. *See* Chikazumi, S.
Opitz, H., electro-erosion of metals, 233, 478; rectifier-controlled reversing rolling-mill drives, 94
Opitz, H., S. Ammareller, and **H. Koelzer,** heat-treatment of steel, 233
Orekhov, G. N. *See* Alekseenko, M. F.
Oreshkin, G. G. *See* Plotkin, N. Z.
Oriel, J. A., control equipment in process industries, 482
Orlov, G. M. *See* Kalashnikova, A. Ya.
Ormont, B. F. *See* Gurevich, M. A.
Orowan, E. *See* Felbeck, D. K.
Orr, D. B., patterns cast in epoxy resin, 224
Ortgies, R. C., emission rates from foundry cupolas, 89
Orths, K. *See* Oelsen, W.
Osborn, H. B., surface hardening by induction heat, 226
Osipov, A. I. *See* Iudin, V. E.
Osipov, K. A., and **S. G. Fedotov,** heat content and mechanical properties, 237
Osipov, A. I., I. Yu. Kozhevnikov, V. E. Iudin, M. L. Sazonov, M. G. Bul'skii, A. G. Alimov, A. M. Skreptsov, and **A. P. Ryabenko,** radioactive determination of P in slags, 491
Osipov, A. I., L. A. Shvartsma, M. T. Bulskii, and **A. G. Alimov,** mixing metal and slag in open-hearth furnaces, 356
Osojnak, B. M., wheel suspensions on ore bridge main trolleys, 231
Ostroukhov, M. Ya. *See* Bardin, I. P.
Ostrowska, T. *See* Śmiatowski, M.
Ota, W., cracks in hot-rolled hard steel bar, 367; heat-treatment of high C–Cr magnet steel, 360
Otta, B., internal cohesion of deep-drawing steel, 489
Owaku, S., and **H. Akasu,** water annealing of high-speed steels, 227
Owen-Barnett, R. A. *See* Jones, B.
Oya, T. *See* Mishima, T.

Pacault, A. *See* Joussot-Dubien, J.
Palatnik, L. S. *See* Lyulichev, A. N.
Palme. *See* Colnel
Palme, R., and **W. Scheiber,** modulus of elasticity, 240
Panetti, M., metal plasticity, 103
Pankowski-Fern, R., dislocations in metal crystals, 483
Papier, J. *See* Granger, L.
Papoff, P. *See* Riccoboni, L.
Papshev, D. D., axial residual stresses, 368
Paquet, J., sintering of iron ore, 81
Paranjpe, V. G. *See* Wadia, N. J.
Parchevskii, G. F., and **N. P. Penkin,** strength of oscillations in spectra of Fe and Ni, 491
Pardue, T. E. *See* Smith, R. C.
Parikh, N. M. *See* Humenik, M., jun.
Parke, R. M. *See* Fullman, R. L.
Parker, C. D., biological organisms and corrosion, 378
Parker, C. J., J. C. Hathaway, and P. D. Blackman, curves from portable differential thermal analysis unit, 371
Parker, C. M., high-strength low-alloy steels, 246
Parker, E. A., electrodeposition of Rh, 480
Parker, E. R., and **J. Washburn,** mechanical properties, 373
Parker, S. J. *See* Dulis, E. J.
Parkes, W. B., hot strength of clay-bonded sands, 358
Parkhurst, R. M. *See* Pecsok, R. L.
Parry, V. F., W. S. Landers, and **E. O. Wagner,** carbonization of lignite and non-coking coals, 215
Partiot, P., applications of "Sulf-Inuz" to aeronautics, 227
Pascal, J., foundry defects, 359
Paschkis, V., effectiveness of chills, 92; energy losses from furnaces, 473
Pashkov, N. V. *See* Vladimirskiĭ, T. A.
Pasquet, M. *See* Sanna, D.; Thibaut, C. G.
Pateman, L. W., and **J. R. Rait,** modern methods of casting, 91
Patterson, W., Institute of Foundry Technology in Düsseldorf, 88
Patti, M., electrodes for electric arc welding, 364
Pattison, J. R., total emissivity of refractory materials, 468
Patton, W. G., aluminium spraying, 236; coating on polished strip, 236; cold forming, 94; stress analysis, 102
Paudrat, A., action of sulphur in polycrystalline structures, 473
Pavlov, V. L. *See* Chekmarev, A. P.
Pavlutskaya, T. I. *See* Rozenfel'd, I. L.
Payen, I., enamel grinding, 366
Pearson, G. L. *See* Read, W. T.
Pearson, J., oil in open-hearth steelmaking, 48; *see also* Turkdogan, E. T.
Pearson, S. W., J. H. Chesters, and **M. W. Thring,** combustion and heat-transfer in O.H. furnace, 360
Pearson, T. F., steel plate for shipbuilding, 355
Pease, R. S., measurement of specimen temperature, 487
Pechman, A., flame spraying, 236
Peck, C. F., jun., *See* Belansky, A. M.
Peck, C. F., jun., and **F. T. Mavis,** failures in iron work rolls, 95; roll breakage, 475
Peck, P. E., flying shears, 70
Pecsok, R. L., and **R. M. Parkhurst,** determination of Mo, 381
Pedan, G. A., quantitative spectrographic analysis of magnesite and magnesia refractories, 495
Pedanov, F. F., rate of deformation in tensile tests, 238
Peebles, W. C. *See* Cohn, E. M.
Peers, A. M., non-uniform anodic dissolution, 243
Pelham, C., clay as binder in synthetic foundry mixtures, 359; differential thermal analysis of clays, 354
Pell, L. S., modern forging presses, 192, 199
Pellini, W. S. *See* Bishop, H. F.; Puzak, P. P.; Sandoz, G. A.
Pelphry, H., roll-forming, 230
Peltzer, O., blast cleaning of metal surfaces, 233; mechanical descaling of rolled products, 98
Pelzel, E., behaviour of spherical metal powders in pressing and sintering, 237
Penkin, N. P. *See* Parchevskii, G. F.
Pen'kov, A. M., and **A. M. Vorobeikov,** fatigue machine for testing steel-cable wires, 368
Pennac, L., A. Mutte, and **M. Monnier,** colorimetric determination of Mo in steels, 109
Pensotti, C., and **E. Mortara,** standardization of spheroidal irons, 89
Percy, J. W., instruments in steel furnaces, 360
Perez, A. Rodriguez, spectrographic analysis without internal standard, 495
Perkins, O. *See* Wrangell, L. J.
Perkins, R. F. *See* Ashton, M. D.
Perlin, I. L., counter-tension in drawing, 475
Permyakov, V. G., Yu. V. Naĭdich, and **S. A. Rybak,** differential magnetic method for studying steel and alloys, 486
Perova, V. V. *See* Arsenishvilil, A. Yu.
Perrier, A.-L., and **E. Ascher,** spontaneous magnetogalvanism and magnetization in ferronickels, 241
Perrin, G. H., magnetic sheet with orientated crystals, 103
Perrin, R., treatment of steel by mixing with molten slag, 86
Perry, C. E., and **B. J. Rayner,** erosion and corrosion in fluid catalytic cracking plants, 378
Perry, T. G., bending and forming, 228
Petch, N. J. *See* Cracknell, A.
Peters, A. *See* Husson, G.
Peters, H. F., clad steels, 98
Peters, R. W., NACA combined load testing machine, 484
Peterson, E. C., bar mill cooling bed arrangement, 231
Peth, H. W. *See* Kotsch, J. A.
Petit, D., new technical ideas in Spain, 467
Petitjean, R., blast furnace equipment, 84
Petrichenko, A. M., A. A. Zayats, and **V. N. Malyshev,** density of foundry moulds, 472
Petropolskaya, V. M. *See* Medvedev, K. P.
Petrulevich, N. I. *See* Gorenshtein, M. M.
Petržela, L., solidification of castings, 472
Petzold, A., pickling residues, 234
Petzold, G., W. Lehmann, and **R. Richter,** hot-top risers in steel casting, 358
Pfann, W. G., and **D. W. Hagelbarger,** electromagnetic suspension of molten zone, 111
Pfarr, F. J., and **A. S. Johnson,** malleable furnace refractory costs, 83
Pfender, M., and **O. Vaupel,** non-destructive testing, 371
Phelps, S. R., *Paper:* "Electrical Requirements for Flying Shears". *Discussion,* 69. *Correspondence,* 73. *Author's Reply,* 76
Philbrook, W. O. *See* Derge, G.
Philbrook, W. O., and **L. D. Kirkbride,** FeO reduction from $CaO–SiO_2–Al_2O_3$ slag, 469
Philibert, J., incubation period in martensitic transformation, 376; martensitic transformation in ferronickel, 375; stabilization of austenite in martensitic transformation, 376
Philipson, G., plastics and metals, 381
Piaskowski, J., structural iron of Parthenon, 409
Piaskowski, J., and **J. Raczka,** production of malleable cast iron, 222
Pickard, R. W., manufacture of steam turbine blading, 97
Pickering, F. B., *Paper:* "Microscopical Examination of Samples of Iron containing Titanium-bearing Inclusions." *Discussion,* 62. *Author's Reply,* 63; *see also* Gemill, M. G.; Lismer, R. E.
Pičman, B., specification of iron ores, 80
Pierce, W. B. *See* Flinn, R. A.
Pignet, J., and **E. de Kerversan,** supersonic testing of heavy forgings and castings, 238
Pill, A. L. *See* Bagshawe, B.
Pines, B. Ya. *See* Geguzin, Ya. E.
Pines, V. G. *See* Genshaft, S. A.
Pinner, W. L., accelerated corrosion test for performance of plated coatings, 492
Pinot, G., simultaneous production of pig iron and cement, 86
Piotrowski, A. *See* Krupkowski, A.
Pischchev, V. M., structure of cast iron, 225
Pitsch, W., shape of carbide particles precipitated in α-iron, 105
Pivnik, E. M. *See* Skvortsov, G. E.
Plaksine, I. N., beneficiation of iron ores, 81
Planner, B. P., isothermal heat-treating, 228
Plaster, H. J., metal spraying by wire process, 236
Plateau, J., metals at low temperatures, 453
Platon, J. G., oxygen-air blast for iron furnaces, 84
Platonova, Z. S. *See* Sukhenko, K. A.

Plešinger, A. M., and **J. Klaban,** heat-resisting silicon cast iron with spheroidal graphite, 471
Plokhov, V. N., E. I. Andreev, and **R. B. Iskhakov,** rolling stainless steels, 476
Plotkin, N. Z., G. G. Oreshkin, and **A. K. Rudkov,** testing sinter, 466
Plyler, E. K., L. R. Blaine, and **E. D. Tidwell,** infra-red absorption and emission spectra of CO, 81
Pobořil, F., M. Knotek, and **M. Zezulová,** austenitic Mn–Cr and Cr–Ni steels, 107
Poczatek, J. J. *See* Findley, W. N.
Podrzucki, C. *See* Czyzewski, M.
Poetter, H., pinholes in steel castings, 473
Pogodin-Alekseev, G. I., evaluating plasticity, 483
Pogodin-Alekseev, G. I., and **N. S. Artemenko,** cold brittleness of rail steel 241
Polansky, D., and **D. T. O'Connor,** fluorography, 370
Polikarpov, Yu. A. *See* Gruzin, P. L.
Pollard, E. I., synchronous condensers for steel mill service, 231
Pollard, W. R., and **J. V. Lawson,** pilot plant for studying corrosion rates, 492
Polovchenko, I. G., carbon blocks in blast furnaces, 468
Polovnikov, V. V. *See* Gaev, I. S.
Polyak, L. Ya., potentiometric analysis of electrolytic baths, 479
Polyakov, A. A. *See* Garkunov, D. N.
Polyakov, A. Yu. *See* Averin, V. V.
Polyanskiĭ, A. N., hardness-control with files, 103
Pomey, G., iron–chromium alloys, 221; X-rays in study of metals, 101; *see also* Bastien, P.
Pontello, A. *See* Cohn, E. M.
Poole, L. K. *See* Thomas, R. D.
Popel, S. I., O. A. Esin, and **Yu. P. Nikitin,** effect of carbon on interfacial tension, 469
Popenova, I. I., and **A. I. Frimer,** etching metals in gaseous discharge, 490
Popov, A. A., and **M. S. Mikhalev,** microstructural observation of decarburized zone of alloy steels, 243
Popov, V. S. *See* Gel'man, A. S.
Popov, Yu. A. *See* Khudak, L. Z.
Popova, N. M., electrolytic phase separation, 491
Popova, N. M., and **K. P. Sorokina,** separation of carbides, 482
Post, D., photoelastic stress analysis for edge crack, 482
Potter, E. C., corrosion and modern power station, 379
Potter, F. J., and **L. Duffy,** *Paper*: "Blowers for use in Iron and Steelworks", 331
Pourbaix, M. *See* Abd El Wahed, A. M.; Deltombe, E.; Laureys, J.
Powell, R. W., *Paper*: "The Effect of Quenching on the Thermal Conductivities and Electrical Resistivities of Steel", 6
Powell, R. W., and **R. P. Tye,** *Paper*: "The Effect of Oil Quenching and Tempering on the Thermal Conductivities and Electrical Resistivities of Three Steels," 10; *Paper*: "Thermal Conductivity and Electrical Resistivity of a 0·4–0·5% Manganese Steel", 286
Prager, W., theory of plasticity, 100
Prance, S. R., tool life, 233
Pražák, M., and **V. Pražák,** corrosion and passivation of metals, 379; corrosion resistance of stainless steels, 379
Pražák, V. *See* Pražák, M.
Preen, W. v., Boudouard equilibrium in blast furnace, 85
Prentice, A., and **P. D. Ritchie,** analysis of siliceous dusts, 110
Prescott, G. W. *See* Lester, W. J.
Preston, R. St. J., and **B. Sanyal,** atmospheric corrosion by nuclei, 108
Preston, T. E. W., argon-arc welding, 233
Price, D., molybdenum coatings, 480
Price, J. B., investment casting, 358
Price, P. E. *See* Monkman, F. C.
Pridantsev, M. V., and **G. V. Èstulin,** effects of skewing of test-pieces on endurance strength of alloys, 238
Pridantsev, M. V., G. L. Livshits, and **D. A. Kal'ner,** properties of steels 15Kh and 12KhN2A containing boron, 104
Prince, A., allotropic transformations in ternary metal systems, 491; reactivity of freshly formed steel surfaces, 493
Profos, P., demineralization in steam-raising plant, 108
Pronin, V. E., and **P. A. Averchenko,** controlling forgings with metallographic microscope, 372
Pronov, A. P., influence of temperature of liquid steel on ingot structure, 221
Prosvirin, V. I., and **S. Y. Sigolaev,** paramagnetic properties of austenitic alloys, 370
Prourzin, V. K. *See* Levin, M. Z.
Prus, A. A., machine for torsion testing of wire, 239
Pryanishnikov, S. S., analytical control in ferrous metallurgical works, 494
Pryce, L., siliceous and titanium-bearing inclusions, 63
Pryce, L., H. Hughes, and **K. W. Andrews,** *Paper*: "The Occurrence of Sigma-Phase in a High-Chromium–Nickel Steel", 289
Puig, A. Camuñas. *See* Carrancio de la Plaza, H.
Pulliam, C. S. *See* Thielsch, H.
Půlpán, R., rolling transformer steel strip for electrical gear, 476
Puppe, K., power required during rolling, 363
Pustovalov, V. V., electron microscope for investigating porous refractory materials, 489
Putilova, I. N., and **L. G. Gindin,** classification of corrosion inhibitors, 494
Putman, J. L., thickness gauges, 232
Putnam, R. T., and **E. J. Roser,** lead–tin–antimony plating, 366
Puzak, P. P., and **W. S. Pellini,** crack arresting in welding, 97
Pyasetskiĭ, I. I., and **I. V. Salli,** vacuum furnace for studying structure of alloys, 377

Quadflieg, J., depth of chill, 226
Quadrat, O., and **M. Beránek,** iron oxides in burning of magnesite, 354
Quanjel, H. E. *See* van Waes, J. P. M.
Quarrell, A. G., strain ageing, 67
Quinlan, E. J. *See* Weisberg, L.
Qvarnström, H. C., metal finishing in Sweden, 99

Rabaté, J. L., lead-base paints for rust protection, 109
Rabinovich, Kh. I., reagent for cementite and phosphorus, 373
Rabot, R., dryers and drying, 366; faults in enamel, 366; furnaces and firing process, 366; sheet surface preparation for enamelling, 366
Rabot, R., and **P. Tyvaert,** application of enamels to sheets, 366
Rabotnov, Yu. N., changing loads during creep, 485; *see also* Danilovskaya, V. I.
Racine, F. L., determination of C and S in steel and cast iron, 244
Raczka, J. *See* Piaskowski, J.
Radavich, J. F., oxidation at elevated temperatures, 489; structure of oxides formed on high-temperature alloys, 488
Radtke, R., heat-resistant casting alloy, 371
Raick, J., thermodynamic equilibrium of blast furnace, 84
Rait, J. R. *See* Pateman, L. W.; Samuel, P.
Ramsaur, O., and **J. E. Treweek,** 3-phase arc furnaces, 87
Rapatz, F., continuous casting and use of oxygen in steel production, 246
Raring, R. H., and **J. A. Rinebolt,** static fatigue of high-strength steel, 103
Rasmussen, R. E. H., cavitation erosion in water mixed with air, 493
Rathbone, M., flying shears, 70
Raub, E., electrolytic nickel deposits, 235
Raubach, G. T., overhead crane maintenance, 231
Rawlings, R., biographical note, 462; solubility of carbon and nitrogen, 55
Rawlings, R., and **D. Tambini,** *Paper*: "The Determination of the Alpha Phase Boundaries of the Iron–Nitrogen, System by Internal Friction Methods", 302; nitrogen in iron anelasticity and solid solubility, 102
Ray, S. K., H. V. K. Udupa, and **B. B. Dey,** brass plating, 236
Rayner, B. J. *See* Perry, C. E.
Read, H. J. *See* Weil, R.
Read, N. J., calcium plumbate, 481
Read, W. T., jun., and **G. L. Pearson,** dislocations in germanium, 374
Reed, G. W., and **A. Turkerich,** uranium content of iron meteorites, 112
Reed, L., and **L. R. Barrett,** slagging of refractories, 468
Reed, L. B., austempering of chain saw parts, 228
Reed, R. J., dual-fuel and combination burners, 353
Reese, S. T., and **N. W. Kearney,** injuries in American coking industry: 1953, 352
Regirer, E. I., calibration of small impact-testing machines, 101
Rehder, J. E. *See* Shnay, R. C.
Rehder, V. E., iron castings, 471
Reich, W. *See* Houdremont, E.
Reichel, W., steel shavings and wire wool, 475
Reier, M., neutron-capture gamma-ray spectra of V, Co, Ti, Fe, Cr, Au, Mn, and I, 104
Reinfeld, H., DEMAG-Humboldt low-shaft furnace process, 84
Reininger, H., yields and losses in wire spraying, 366
Rekar, C., barytes in iron ores, 351; Macedonian iron ores, 351
Remond, V., and **J. Cyther,** metallurgical coke in Lorraine, 215
Remy, G., forgeability of steels, 94
Renburg, W. W., design and construction of transformers, 231
Rendel, G. H., pinholes in thin steel, 479
Revell, R. S. M. *See* Agar, A. W.
Rex, J. W., heat-treating furnaces, 473
Reymond, H., electrodeposition in Switzerland, 99
Reynolds, C. C., W. T. Whittington, and **H. F. Taylor,** hardenability of ductile cast iron, 223
Rhines, F. N., grain-boundary displacement in creep, 485
Rhodes, E. C. *See* Knight, J. R.
Rhodin, T. N., analysis of thin films by X-ray emission spectrography, 488
Riccoboni, L., P. Papoff, and **I. M. Vezzosi,** corrosion tests, 107
Rich, S. R., ultrasonics in electroplating, 479
Richards, J. C., granular flow through bunkers, 352
Richards, T. Ll., and **W. T. Roberts,** austenite-martensite transformation, 375
Richardson, F. D., solubility of carbon and nitrogen, 53
Richardson, H. L., furnace fume control, 467
Richter, H. *See* Strohmeier, G.
Richter, R. *See* Petzold, G.
Ride, R. N., corrosion inhibitors in cooling systems, 378
Ridgion, J. M. *See* Lang, C.

Ridgion, J. M., and **A. M. Whitehouse,** *Paper*: "Studies of Blast-furnace Assessment", 249
Ridley, R. W., and **H. J. Tapsell,** tensile-creep of Mo–V steel, 485
Ridsdale, N. D., obituary, 209
Riebensahm, P., surface-hardening, 227
Riedinger, G., testing degreasing agents, 365
Riege, W. *See* Gesell, W.
Rieppel, P. J. *See* Sopher, R. P.
Rieskamp, K. H. *See* Oelsen, W.
Riley, M. W., coined or embossed sheet metals, 362
Riley, R. V. *See* Jackson, D.
Rinebolt, J. A. *See* Raring, R. H.
Ring, R. D. *See* Hensley, J. W.
Ripp, E. Kh. *See* Ermolov, I. N.
Ripperger, E. A., diezoelectric strain gauge, 482
Rischbieth, J. R., paints and corrosion protection, 379
Ritchie, P. D. *See* Prentice, A.
Ritter, F., cathodic protection, 244
Rivière, M., performance trials at Ijmuiden, 214
Robba, M., non-destructive testing of metals, 101
Robelotto, S. M. *See* Nippes, E. F.
Robert, O., systems of units, 367
Roberts, G. A. *See* Grobe, A. H.
Roberts, W. T. *See* Richards, T. Ll.
Robertson, J. M., metals used at high temperatures, 102
Robertson, W. D., chemistry of metal surfaces, 373
Robins, F. W., monks as ironmasters, 382
Robinson, J. W. *See* Elliott, C.
Robustov, A. M., and **G. A. Olesin,** metallurgical production in Ukraine, 217
Rocha, E. Frias, chromite production at Pium-i, 213
Rodigina, E. N. *See* Gomel'skiĭ, K. Z.
Rodionova, N. I., electrolytic separation of carbides from steel, 372
Roehl, E. J., E. B. Michel, and **L. R. Westbrook,** yellow brass plating, 480
Roemer, E. *See* Mintrop, R.
Roesch, K. *See* Jungbluth, H.; Klein, U.; Oelsen, W.
Rogach, A. P., A. S. Romanenko, and **A. M. Kargin,** protection of cooled parts of O.H. furnaces, 109
Rogers, G. J., foundry problems and principles, 222
Rogers, J. *See* Gordon, F. R.
Rogers, J., and **B. Russell,** sand-bonding properties of New Zealand bentonites, 224
Rogers, W. F., ammonia treatment for tank and casting annulus corrosion, 243
Rogoza, G. D., cold-rolled auto sheet, 230
Rohn, H., linings of core-less induction crucible melting furnaces, 83
Roiter, V. A., V. A. Yuza, and **A. N. Kuznetsov,** reduction of iron oxides with hydrogen and carbon monoxide, 469
Romanenko, A. G., coating pig-casting machine moulds, 84,
Romanenko, A. S. *See* Rogach, A. P.
Romanovsky, V., corrosion in tropical conditions, 493
Romováčkova, H., and **F. M. Kessler,** determination of oxygen and combustible material in coal, 245
Roncin, J. *See* Bruma, M.
Roneš, J., regeneration of sulphuric acid pickling liquor, 234
Roos, A., electron chemistry in metallurgy, 372; metal physics, 482; oxidation-resisting steels in U.S., 357
Rooste, E. E., electric contact alloys and sintered iron bearings, 481
Roper, J. F., foundry lighting practice, 471
Roques, C. *See* Ferry, R.
Rose, A., and **W. Strassburg,** transformation and hardening of structural steel, 376
Rose, H. J., and **R. A. Glenn,** coal, chemical and other process uses, 351
Rosenberg, H. M., thermal conductivity of metals, 101
Rosenberg, S. J. *See* Meyerson, M. R.
Rosenberg, S. J., and **J. D. Grimsley,** *Paper*: "A Study of the Impact Properties of Boron-Treated Steel". *Discussion*, 456
Rosenthal, D. *See* Friedmann, N. E.
Roser, E. J. *See* Putnam, R. T.
Rösner, K. *See* Cuscoleca, O.
Ross, N., and **P. H. R. Lane,** stress probing, 483
Ross, S. T., and **R. P. Sernka,** alloy steels, 460
Ross, S. T., R. P. Sernka, and **W. E. Jominy,** endurance limit and torsional properties of steel, 101
Rosseau, L. B., molten baths and mechanisms, 226
Rossin, A., Terni-type O.H. furnace, 219
Rossin, P. C., arc melting in high vacuum, 359
Rossow, E., strengthening of steels, 227; tests for materials and heat-treatment, 225–226; Vickers-hardness testing, 485; Vickers and Rockwell hardness measurements, 240
Rostovshchikov, F. G. *See* Tyurin, A. I.
Rote, F. B., E. F. Chojnowski, and **J. T. Bryce,** malleable base spheroidal iron, 471
Roth, J. F., wood pattern construction standards and specifications, 224
Rotherham, L., and **C. R. Tottle,** effect of alloying on creep, 485
Rouse, S. R. *See* Thomas, J. D.
Rowland, W. *See* Grant, N. J.
Royak, D. B. *See* Kolosov, M. I.
Royer, M. B. *See* Buehl, R. C.
Rozenfel'd, I. L., and **I. K. Marshakov,** metallic corrosion in gaps and slots, 493
Rozenfel'd, I. L., and **T. I. Pavlutskaya,** atmospheric corrosion of metals, 492
Rozenfel'd, I. L., Z. A. Vrutsevich, and **M. V. Beganov,** intercrystalline corrosion in stainless-steel equipment, 493
Rudkov, A. K. *See* Plotkin, N. Z.
Rudneva, A. V. *See* Bardin, I. P.
Rudnitskiĭ, N. M., fatigue-strength of surface layers and coatings, 369
Ruffle, T. W., and **P. C. Kirby,** slow-cooling cracks, 473
Rühenbeck, A., and **G. Schüssler,** bath nitriding of high-speed steel tools, 227
Rulfs, C. L., J. Lagowski, and **R. E. Baker,** amperometric determination of V, 109
Rundle, R. E. *See* Florio, J. V.
Runov, A. E. *See* Dashevskiĭ, Ya. V.
Ruopp, W., foamed blast-furnace slag, 85
Ruppert, J. A. *See* Heindl, R. A.
Ruppert, W. *See* Münster, A.
Russ, F. E., gas carburizing, 361
Russell, B. *See* Gordon, F. R.; Rogers, J.
Russell, G. I., cathodic protection for steel pipelines, 108
Russell, J. E., ingot structure, 450, 451
Russell, W., high-pressure wet cleaning and de-coring, 472
Russenberger, M., and **G. Földes,** universal fatigue-testing machine, 483
Rutherford, F. C., metal finishing in Canada, 99
Rutledge, J. E., quality control, 370
Ruttmann, W., and **K. Baumann,** testing of austenitic welds in steam power plant, 96
Ryabenko, A. P. *See* Osipov, A. I.
Ryabokon, N. K., S. V. Gubert, I. Ya. Vinokurov, and **G. D. Feigin,** rolling I-beams of lightened types, 476
Rybak, S. A. *See* Permyakov, V. G.
Rylands, G. K., metals at low temperatures, 454
Sabaneev, P. F., automatic regulation of arc-furnace cooling, 220
Sabatier, J., and **J. Moussu,** carbonization in France, 214
Sachs, K., Kirkendall effect in metals, 479
Sachse, A., explosion in cupola, 471
Safranek, W. H., and **C. L. Faust,** copper anodes in acid and cyanide plating baths, 480
Saga, T., and **O. Miyakawa,** dispersion of Shore hardness values, 485
Sagel, K. *See* Gürtler, G.
St. Pierre, G., sulphur distribution in open-hearth furnace, 87
Saitô, H. *See* Masumoto, H.
Sakai, C., improvements of blast-furnace practice, 216
Sakaiyama, K. *See* Morioka, S.
Saller, H. A., R. F. Dickerson, and **E. L. Foster, jun.,** vacuum-melted Zr and alloys, 359
Salli, I. V. *See* Graifer, E. Z.; Pyasetskiĭ, I. I.
Salt, F. W., iron-zinc alloy electroplating, 235
Salter, F. S., modern forging presses, 202, 205
Samans, C. H. *See* Tisinai, G. F.
Samarin, A. A. *See* Shvartsman, L. A.
Samarin, A. M. *See* Averin, V. V.; Bezobrazov, S. V.; Grigoryan, V. A.; Leventsev, N. P.; Vishnayakov, A. V.
Samarin, A. M., and **A. A. Yaskevich,** influence of Nb and Ti on properties of stainless steel, 372
Samsonov, G. V., physical properties of interstitial phases, 372
Samsonowicz, Z., shell moulds, 359
Samuel, P., L. G. Finch, and **J. R. Rait,** phase diagram for iron–nickel–carbon alloys, 106
Samuel, R. L., N. A. Leckington, and **H. Dorner,** chromium diffusion, 479
Samuelson, O., and **B. Sjöberg,** separation of Ca and Al from iron by ion exchange, 245
Sander, W., sand drying plant for CO_2 sand, 222
Sanders, C. A., and **N. Levinsohn,** defective castings, 90
Sanders, R. F. *See* Leach, C. B.
Sandford, F., and **S. Fransson,** refractoriness of quartz and quartzite, 354
Sandiford, F. G. C., mechanized welding in aero-engine industry, 364
Sandler, N. I., X-ray camera, 487
Sandoz, G. A., H. F. Bishop, and **W. S. Pellini,** notch-ductile high-strength nodular irons, 89
Sanna, D., conduction losses in Cowper stoves, 354; hot blast stoves, 82
Sanna, D., and **M. Pasquet,** Cowper stoves as heat accumulators, 216
Sano, T. *See* Iwase, K.
Sanyal, B. *See* Preston, R. St. J.
Saraglić, A., dimensions of pouring system for casting of steel, 357
Sarx, H. F., wash-primer as surface preparation for metals, 99
Sasaki, R. *See* Ono, K.
Sato, M., wetting effect and surface tension of solids, 241, 364, 486; *see also* Honda, K.
Sato, R., and **N. Tabata,** reduction of iron ores, 81
Sato, T., T. Nishizawa, and **Y. Honda,** carbide in ball-bearing steel, 105
Saubermann, W., foundry cores by carbon dioxide process, 359
Sauer, K., evaluation of ores, 80
Sautner, K., corrosion in ship construction, 108
Savage, J., continuous casting, 357; rupture of billet skin in continuous casting, 88
Savage, L. H. W. *See* Ashton, M. D.
Savage, L. H. W., and **M. D. Ashton,** *Paper*: "Cooling of 15-ton Ingots between Teeming and Stripping". *Discussion*, 443. *Author's Reply*, 446
Savage, R. E., heat treating ductile iron, 360

Savage, W. F. *See* Nippes, E. F.
Savioli, F., and **C. Mellere,** pelletizing of hematite concentrates, 81
Savkin, P. V. *See* Geskin, S. A.
Sawa, S., hydrogen in molten steel, 219
Sawamura, H., and **T. Mori,** effect of nitrides on austenitic grain size, 105; thermodynamic investigation of non-metallic inclusions, 373
Sawamura, H., O. Tajima, K. Akamatsu, and **H. Muranaka,** acid-resistant high-silicon iron, 379
Sazonov, M. L. *See* Iudin, V. E.; Osipov, A. I.
Schaaber, O., production control of salt baths in Germany, 226; tempering by intermediate-stage process, 94
Schaal, A., radiographic stress measurement, 240
Schaar, K. *See* Wiegand, H.
Schack, A., heat recuperation, 214
Schael, E. *See* Möhl, K.
Scharr, M. G., sources for radiographic use, 495
Schaumann, H., nitriding baths for cutting tools, 227
Scheiber, W. *See* Palme, R.
Scheible, H. G. *See* Shyne, J. J.
Scheil, E., distortion and crack-formation in hardened steels, 228; nuclei and nucleating materials in metallic melts, 223; simultaneous carburization and oxidation of steel during case-hardening, 226
Schelderup, G., electrically-heated soaking pits, 93
Schenck, H., German iron and steel industry, 112; physico-chemical research in iron and steel industries, 112; science in iron and steel industry, 383; *see also* Dehlinger, U.; Görlich, H.-K.; Koerfer, E.
Schenck, H., and **H. Esch,** properties of metallurgical coke, 353
Scherzer, K., induction melting, 471
Schiegner, H., construction and setting of patterns, 224
Schiffers, H. *See* Dicke, R.
Schikorr, G., anti-corrosion packing of metal articles, 380
Schillmoller, C. M. *See* Neumaier, B. W.
Schlechtweg, H., stress measurements in cast iron, 240
Schlegel, H. *See* Krusenstjern, A. V.
Schmauch, H. *See* Seeman, H. J.
Schmid, H. *See* Köster, W.
Schmidt, E. X., utilization of fuel gases, 353
Schmidt, T., gaseous carburization and nitriding, 227
Schmiedel, W., and **H. Lange,** effect of external tension in martensite formation, 376
Schmiegelow, E., quality control in mass production, 247
Schmitt, C. R., non-flammable fluids, 231
Schmitt, W., Siemens-Martin furnaces treating pig iron and scrap, 219
Schneider, C. H. L., casting of pig iron and non-ferrous metals, 84
Schneider, O., gas radiator heating, 476; heating and annealing furnaces in strip mills, 93
Schneider, R., and **R. Vogel,** equilibrium diagram for iron/iron-phosphide/tungsten-phosphide system, 377
Schneidewind, R., nodular irons, 224
Schoeck, G., and **A. Seeger,** extended dislocations, 374
Schoek, G. *See* Cochardt, A. W.
Schoen, F. C., function of engineering department in steel plant, 231; rotary hearth furnace for heating plate-mill slabs, 93
Schofield, C., maintenance painting in steel industry, 99
Scholefield, H. H., European vacuum melting, 359
Scholze, W. G., D. V. Doane, and **G. A. Timmons,** effects of Mo on pearlitic malleable iron, 224
Schopp, C. O. *See* Sutherland, J.
Schrader, A. *See* Wever, F.
Schrader, H., carburization of steel, 226; heat-treatment of low-alloy high-speed tool steels, 93
Schubert, C. E., baking of cores, 358
Schubert, K., polymorphism of iron, 372
Schumacher, G. *See* Hofmann, W.
Schulman, J. H., and **R. B. Waterhouse,** lubricant properties of emulsions, 364
Schultinck, L., H. L. Spier, and **A. J. van der Wagt,** wear of diamond wire-drawing dies, 362
Schultz, G., rust transformers, 234
Schultze, W., hardness-tester for determination of depth of chill, 486
Schulz, E. H., age of wrought iron, 382
Schürmann, E. *See* Trömel, G.
Schüssler, G. *See* Rühenbeck, A.
Schutz, K. *See* Abger, Th.
Schwackhöfer, W., combustion calculations for Austrian coals, 466
Schwarz, E., Lorraine coals, 352
Scwartz, F. L., and **R. H. Eaton,** measuring gear wear by Geiger counter, 370
Schwarz, K., industrial air-pollution, 353
Schweitzer, G. K., and **B. L. McDowell,** co-precipitation of Co with nickel dimethylglyoxime, 245
Schwiete, H.-E., and **H. Stollenwerk,** transformation of quartzite rocks, 83
Scortecci, A., and **C. Durand,** colour metallography of ferrous alloys, 106
Scott, G. G., gyromagnetic ratio of iron, 370
Scott, J. H., predicting corrosion resistance by microscopic examination, 493
Seager, W. H. *See* Gattenmeyer, J. L.
Seeger, A., jogs in dislocation lines, 374; stacking faults in close-packed lattices, 374; *see also* Schoeck, G.
Seeman, H. J., and **U. Hintzpeter,** microscopic information from carbide separations, 373
Seeman, H. J., and **H. Schmauch,** yield-points of metals, 368
Sefing, F. G. *See* Greene, R. J.
Seigle, L. L., thermodynamic properties of solid Fe–Au alloys, 377
Seitz, F. *See* Koehler, J. S.
Seitz, F., and **J. S. Koehler,** radiation disarrangement of crystals, 373
Sejournet, J., invention of steel extrusion by glass lubrication, 94; Ugine-Sejournet process for hot extrusion of steel, 94
Selivanova, V. A. *See* Dubrov, N. F.
Sellier, E., welding of steels in argon atmosphere, 97
Seloron, J., continuous steel casting, 86; *see also* Chouvel, R.
Semenkovich, S. A. *See* Smirnov, A. V.
Sen, S., and **R. Singh,** forsterite refractories, 215
Serfass, E. J., and **R. M. Muraca,** colorimetric determination of lead in effluents, 110
Sergievskaya, T. V., temper brittleness, 488
Serna, M. Cruz. *See* Marti, F. Burriel
Sernka, R. P. *See* Ross, S. T.
Serra, B. *See* Boned, J. A.; Feliu, S.
Serra, M., and **S. Feliu,** anode passivation or iron in electrolytes, 380; chemical polishing of iron, 479
Serre, J., long distance gas transmission for Lorraine, 82
Servi, I. S. *See* Spendelow, H. R., jun.
Seul, V. *See* Meiswinkel, H.
Sevren, R. *See* Decker, A.
Seyb, E. J. *See* Stareck, J. E.
Sgambetterra, E. S., sintered materials in motor car industry, 481
Shaevich, A. B. *See* Grishchenko, M. P.
Shakhova, P. G. *See* Yurist, I. M.
Shalnev, K. K., cavitation erosion, 494
Shanahan, C. E. A., soda ash desulphurization, 356
Shapiro, B. S., All-Union conference of rolling-mill operators, 94
Shapiro, L. V., roll changing, 476
Shapiro, M. B., heat-treatment of weld surfaces, 364
Shapoval, I. M. *See* Bel'chenko, G. I.
Shaw, F. M., collection of cupola dust, 471
Shaw, H. L., iron and mild steels, 469
Shaw, M. C. *See* Loewen, E. G.
Shaw, R. B., stainless steel melting, 87
Shchapov, N. P. *See* Volokhvyanskaya, E. S.
Shchurenko, M. A., semi-automatic grips, 239
Shedd, E. S. *See* Engel, A. L.
Sheftel', N. I., cold rolled transformer steel, 230
Sheinhartz, I. *See* Hausner, H. H.
Shelkov, A. K., by-product coking industry, 214
Shen' Syao-Tsin, effect of tempering temperature on anisotropy, 474
Shephard, H. D., hot tops for ingots, 221
Sherby, O. D., and **J. E. Dorn,** high temperature creep, 485
Shikhov, V. N., introduction of radioactive isotopes of P into metal and slag, 495; *see also* Esin, O. A.
Shilling, W. G., hardness testing, 487
Shillitoe, H., obituary, 349, 427
Shilyaev, P. N. *See* Benua, F. F.
Shimizu, H. *See* Koshiya, K.
Shimodaira, S. *See* Endo, H.
Shimokawa, Y., weldability of steel pipe, 96
Shimokawa, Y., and **T. Fujii,** deep-drawing properties of steel strip, 369
Shishido, K. *See* Imai, Y.
Shklyarskaya-Smyalovskaya, Z. *See* Smyalovskii, M.
Shnay, R. C., risering requirements of nodular iron, 222
Shnay, R. C., and **S. L. Gertsman,** risering of nodular iron, 358
Shnay, R. C., J. E. Wilson, and **J. E. Rehder,** annealing of blackheart malleable iron, 90
Shneerov, Ya. A. and **A. N. Morozov,** open-hearth smelting, 356
Shor, G. I. *See* Zaslavskii, Yu. S.
Shortsleeve, F. J. *See* Dana, A. W., jun.
Shreider, A. V., testing stainless steels for intercrystalline corrosion, 493
Shuk, N. P. *See* Lintschewski, B. W.
Shum, B. M., manipulators for blooming mill, 230
Shumilov, K. D. *See* Levin, M. Z.
Shumilov, M. A. *See* Gruzin, P. L.
Shur, A. B., distribution of gas stream from gas temperatures in off-takes, 85
Shur, Ya. S. *See* Zaikova, V. A.
Shutkin, N. I., bottom pouring without solidification, 221
Shvarts, D. M., and **I. S. Nilova,** spectrographic analysis of Ni production slags, 381
Shvartsman, L. A., and **A. A. Samarin,** physico-chemical properties of molten slags, 469; *see also* Osipov, A. I.
Shyne, J. J., H. N. Barr, W. D. Fletcher, and **H. G. Scheible,** electro-phoretic deposition of metallic and composite coatings, 479
Sibbitt, W. L. *See* Zoss, L. M.
Šícha, M. *See* Zedník, V.
Siddall, R. G., ingot cooling, 444
Siebert, C. A. *See* Keith, R. E.
Siegel, H., measurement of plasticity of non-consolidated mould sand, 222
Siegfried, W., intercrystalline fractures, 485
Sieggreen, H. G., shell mould process, 358
Signora, M., wear and corrosion in site engineering, 380
Signora, M., and **F. Baldi,** determination of gases in steels and cast irons, 110; resistance to hot oxidation of Fe–Cr–Al and Ni–Cr alloys, 379
Sigolaev, S. Y. *See* Prosvirin, V. I.
Silaeva, E. V. *See* Stepin, V. V.
Simmons, W. F., and **H. C. Cross,** elevated temperature properties of carbon steels, 104
Simon, J. *See* Triché, H.

Simons, E. L., G. F. Browning, and **H. A. Liebhafsky,** sodium sulphate in gas turbines, 243
Simons, E. N., Georges Charpy, 239
Simons, H. P. *See* Woo, D.
Simonura, C. *See* Okamoto, M.
Simpson, A. W. *See* Bates, L. F.
Singer, A. R. E., hydraulic and crank presses for cold-working operations, 474
Singh, R. *See* Sen, S.
Singh, S., and **P. H. Gandhi,** effects by explosives with lined cavities in steel, 239
Sinnot, M. J. *See* Keith, R. E.
Sippell, K. W., flame cleaning, 234; *see also* Berg, S.
Širca, F., mechanism of diffusion of copper and iron, 371; *see also* Žumer, M.
Sistiaga, J. M. *See* Hofmann, W.
Sjöberg, B. *See* Samuelson, O.
Skorichenko, I. K. *See* Tyurin, A. I.
Skornyakov, G. P., evaporation of electrodes, 364
Skow, M. L. *See* Heindl, R. A.
Skreptsov, A. M. *See* Osipov, A. I.
Skvortsov, G. E., A. N. Ivanova, E. E. Levin, and **E. M. Pivnik,** phase-contrast method in metallography, 489
Slattenschek, A., determining properties of steel and carburizing agent, 226
Slob, J., hearth blasting, 234
Smallman, R. E. *See* Williamson, G. K.
Smiatowski, M., and **J. Foryst,** deformation of steel, 483
Smiatowski, M., and **T. Ostrowska,** inhibiting action of fatty acids on stress corrosion of steel, 380
Smiatowski, M., and **Z. Szklarska-Smiatowska,** diffusion of cathodic hydrogen in iron, 371
Smirnov, A. V., S. A. Semenkovich, and **F. A. Bogachev,** descaling with sodium hydride. 363
Smirnov, N. S. *See* Kakovskii, I. A.
Šmirous, K., preparation of pure iron, 469
Smit, J., and **H. G. van Bueren,** elastic after-effect in α-iron, 482
Smit, R., radiation pyrometers, 215
Smith, B. O., automatic control in steel industry, 482
Smith, B. O., and **A. P. H. Jennings,** process control, 232
Smith, C. R., statistical techniques for metal working problems, 237
Smith, D. *See* Southern, H.
Smith, F. H., pretreated steel sheet for vitreous enamelling, 98
Smith, F. H., and **T. C. Tapp,** electrolytically coated sheet steel, 480
Smith, F. R. *See* Flinn, R. A.
Smith, G. V., strength at elevated temperatures, 368
Smith, J. B., heat-treatment furnace, 473
Smith, J. F., biographical note, *facing* 384
Smith, J. J., Mathieu's equation, 487
Smith, R. C., T. E. Pardue, and **I. Vigness,** mechanical properties of steels, 484
Smith, R. R., concentration of ores, 81
Smith, S., propane and metal working, 96
Smith, T. B. *See* Glover, S. G.
Smith, W. R., joining tubes to tube-sheets, 478
Smoluchowski, R., diffusion in grain boundaries, 374
Smolyarenko, D. A., All-Union Steel-Making Conference, 217
Smrček, K., and **K. Bartoš,** corrosion studies on Zn in waters, 380
Smuchkova, T. V. *See* D'Yachenko, P. E.
Smushkova, T. W. *See* Djatshenko, P. V.
Smyalovskii, M., and **Z. Shklyarskaya-Smyalovskaya,** mechanism of cathodic processes, 365
Snekvik, E., cadmium and zinc coatings, 235; standards in electroplating, 235
Snell, W. A. *See* Moeller, R. W.
Snider, G. J. *See* Wallace, J. F.
Snow, W. *See* Wallace, J. R.
Snyder, E. H., steel specifications, 237
Sobers, W. B., sampling iron for C determination, 494
Sochevanova, M. M., determination of Ca and Mg in limestones and dolomites, 495
Soisson, C. *See* Meunier, F.
Sokolov, P. S., determining resistance to fracture, 239
Sokolova, A. V., spectrographical laboratory for steel testing, 491
Sokolovskii, V. I., and **V. S. Gashukov,** stresses in cold-rolling tube mill, 230
Solov'eva, A., and **A. T. Vagramyan,** cathodic polarization, 365
Somiya, T., analytical chemistry of iron and steel, 110
Sommer, F., American electric steel production, 356; melting methods in electric furnaces, 87
Sood, D. K. *See* Bannerjee, A.
Sopher, R. P., A. J. Jacobs, and **P. J. Rieppel,** weld-metal cracking in high-strength steel, 232
Sorochan, N. G. *See* Molotkov, L. F.
Sorokin, L. A., joint stresses in blast furnaces, 84
Sorokina, K. P. *See* Popova, N. M.
Sorpko-Novitskaya, A. A. *See* Krushchov, M. M.
Sosman, R. B., phases of silica, 468
Southern, H., F. A. Gray, and **D. Smith,** combustion and thermal transfer in reheating furnaces, 360
Spalding, D. B., flame phenomena with chain reaction, 81
Spangler, F. L., heat-treatment of iron powder parts, 481
Spath, W., stability of materials under stress, 100
Specker, H., determination of trace elements by concentration, 245
Speight, G. E., siliceous and titanium-bearing inclusions, 62
Speiser, R. *See* Gleiser, M.
Speiser, R., and **J. W. Spretnak,** vapour pressure of metals and alloys, 360
Speith, K. G., and **A. Bungeroth,** vertical continuous casting of steel, 86
Spektor, A. G., structures with spherical grains, 373
Spencer, K. A., cathodic protection installations at Kwinana, 108
Spendelow, H. R., jun., I. S. Servi, and **G. A. Fritzlen,** vacuum melting of high-alloy materials, 359
Spendlove, M. J., vacuum distillation, 360
Špičák, K. *See* Bárta, R.
Spier, H. L. *See* Schultinck, L.
Spierenburg, D. P., European Coal and Steel Community, 382
Spooner, N. F., and **J. M. Thomas,** Chromel–Alumel thermocouples, 83
Sprague, J. H., annealing facilities at Ford Motor Co., 473
Sprankle, A. F., effect of deoxidation and hot-work reduction on magnaflux indications, 241
Spretnak, J. W. *See* Gleiser, M.; Speiser, R.
Spring, S. *See* Brown, L. J.
Springer, H., heat-treatment of high-speed steel tools, 228
Springer, R., electroplating and metal finishing in Germany, 99
Spruance, F. P., cleaning metal prior to phosphating, 234
Srinivasan, M., Thomas steel for rails, 246
Staal, P., blasting thick steel plate, 234
Staats, H. N., depth of cracks, 370
Stairmand, C. J., dust collectors, 471; gas-cleaning equipment, 467
Stålhed, J., sponge iron production, 86
Stang, N. A., electro-spark machining of metals, 233
Stanley, J. K. *See* Tisinai, G. F.
Stapleton, J. M., blowing-in blast furnace, 469
Stareck, J. E., E. J. Seyb, and **A. C. Tulumello,** effect of Cr deposits on fatigue strength of hardened steel, 479
Starkey, F., flying shears, 72
Startsev, D. A. *See* Gomel'skii, K. Z.
Startsev, G. P. *See* Gerasimova, N. G.
Stauffer, W. A., wear of metals by sand erosion, 241
Stavert, T. C., non-destructive testing of water-wheel generating unit, 101
Stedman, A. J. *See* Jackson, D.
Steele, J., jobbing investment foundry in South Africa, 91
Steele, M. C., and **L. C. Eichberger,** foil gauges for measurement of large strains under pressure, 487
Steer, D. T. *See* Jones, H. G.
Stefanovich, M. A., movement of gases in blast furnace, 85
Steffes, M., and **A. Graff,** "Schack" metallic recuperators at Arbed, 352
Steffes, M., and **P. Mosel,** gas turbine division of Dudelange (ARBED), 214
Steghart, F., a furnace scanning periscope, 48
Steinebach, J. G., shell moulding, 359
Steinherz, H. A., heat-treatment for magnetic core iron, 226
Steinitz, R., and **F. I. Zaleski,** semi-formed drawing stock by powder metallurgy, 100
Steinmetz, K., accident prevention in heat-treatment plants, 93
Steinrath, H., and **H. Ternes,** corrosion and corrosion protection of iron and steel, 492
Stengel, B., and **R. Vogel,** Fe–P–V system, 107
Stephens, H. A. *See* Dunbar, A. F.
Stepin, V. V., and **E. V. Silaeva,** gravimetric determininatron of tungsten, 245
Stepken, G., single-anode rectifier control for reversing rolling mills, 95
Stern, F. B., jun., stresscoat, 484
Stern, M., effect of alloying elements on hydrogen overvoltage, 244
Stern, P., welding progress, 232
Stevens, L. D. *See* Holland, J. W.
Stewartson, R., *Paper:* "Mechanical Design of Flying Shears." *Discussion,* 69. *Correspondence,* 73. *Author's Reply,* 74
Stierstadt, K., lattice transformation of irreversible iron–nickel alloys, 490
Stoch, C. M., dust control in grinding machines, 471; integral exhaust system for swing-frame grinding machines, 471
Stokes, H. W., steel in France, 111
Stollenwerk, H. *See* Schwiete, H.-E.
Storcheim, S., annealing and hot working of metals, 227
Storchs, J., rail anchorage in steelworks, 95
Storms, W. R. *See* Needham, A. B.
Stout, R. D. *See* Danko, J. C.; Gross, J. H.
Strähuber, H.-F., Siemens-Martin furnaces, 219
Strassburg, F. W., bainite hardening of low-tungsten high-speed tool steels, 228
Strassburg, W. *See* Rose, A.
Strasser, F., assembly of sheet components, 474; die stamping and machining, 474; sectional dies, 474; tolerances in metal stampings, 362
Street, R., and **E. O. Hall,** magnetic domain structure in twinned crystals of silicon iron, 241
Stremsdoerfer, J., deformation between rolls of blooming mill, 95
Stringer, J. D. *See* Cook, P. M.
Stroh, A. N., brittle fracture and yielding, 100
Strohmeier, G., and **H. Richter,** statistical mathematics in steelworks, 383
Stuhlmann, W., American hardening plants, 228; time-temperature transformation curves, 228
Stukach, A. G., cooling of metal during hot rolling, 95
Stumpf, A., statistics in operational research, 112
Stupar', S. I., magnesite inserts for fireclay sockets, 88

Succop, J. A., die block for closed die forging, 474
Such, T. E. *See* Comley, A. W. F.
Suciu, S. N. *See* Zoss, L. M.
Sudo, K. *See* Isihara, T.
Suess, T., obituary, 349
Sugai, Y. *See* Masumoto, H.
Suk, V., M. Malát, and **A. Jeníčková,** determination of Bi, Ni, and Co, 110
Sukhenko, K. A., I. O. Mladentseva, N. P. Gorozhankina, Z. S. Platonova, A. V. Aksenova, and **S. M. Il'ina,** alloy standards for spectrographic analysis, 495
Sukhovalova, V. V., spectrographic analysis for arsenic in plain carbon steels, 491
Sullivan, E. J., jun., C. M. Adams, and **H. F. Taylor,** risering of grey iron castings, 222
Sully, A. H., solidification of steel, 447
Sunnen, T., protection of underground steel conduits, 244
Suprun, L. A. *See* Glikman, L. A.
Suseela, B., ferricyanide-ceriometric determination of V, 244
Susuki, S. *See* Gotô, H.
Susuma, M., corrosion of carbon steel in Al sulphate solution, 380
Sutherland, J., and **C. O. Schopp,** shell moulding, 91
Suttle, R. C., regulator equipment, 477
Suzuki, T., and **T. Imura,** dislocations in face-centred cubic metals, 374
Svantesson, S., brittle fracture, 486
Svechnikov, S. V., photothyratron indicator, 230
Svensson, J., particle size distribution, 81
Sventitskiĭ, N. S. *See* Gerasimova, N. G.
Sweo, B. J. *See* Wuellner, J. F.
Swern, L. *See* Duncan, B. J.
Swett, H. C., chemical analysis for quality control, 110
Syao-Tsin, Shen', effect of tempering temperature on anisotropy, 474
Sykes, C., internal stresses in forging, 362; metallurgical techniques, 237
Sykes, E. C. *See* Haddrell, V. J.
Sylvester, R. L. *See* Van Atta, C. M.
Syme, A. W., activity sampling, 222
Sysoev, S. I., drying foundry sand moulds with carbon dioxide, 359
Szczeniowski, S., performance criteria for hot-blast stoves, 216
Szikora, G. *See* Török, M.
Szklarska-Smiatowska, Z. *See* Smiatowski, M.

Tabata, N. *See* Sato, R.
Taburinskiĭ, G. S., core sand-blowing machine, 91
Tachikawa, K. *See* Mishima, T.
Taganov, K. I. *See* Gerasimova, N. G.
Tagaya, M., and **S. Nenno,** effect of Al on sigma formation in Fe–Cr system, 106
Tagaya, M., and **I. Tamura,** quenching media, 361
Taits, E. M., and **G. E. Fridman,** use of semicoke from peat in coking blends, 352
Tajima, O. *See* Sawamura, H.
Takamura, J. *See* Konishi, I.
Takano, S., M. Iida, and **S. Gotô,** determination of nitrogen in steel, 380
Talbot, A., cores and moulds by CO_2 process, 358
Talbot, J., polygonization phenomena, 373
Tambini, D. *See* Rawlings, R.
Tamura, I. *See* Tagaya, M.
Tanimura, H., iron and steel casting industry in Japan, 222
Tapp, T. C. *See* Smith F. H.
Tappero, C. C., productivity problems, 496; productivity in wire mill 94
Tapsell, H. J. *See* Ridley, R. W.
Tarnaviskiĭ, A. L. *See* Nedoviziĭ, I. N.
Tatalovich, S., protective devices on ore and coal bridges, 231
Tatievskaya, E. P. *See* Chufarov, G. I.
Tatsukawa, I. *See* Hotta, H.
Taub, A., deoxidation of malleable iron, 222
Taubert, E. *See* Grüner, P.
Täubert, P., theory of strain hardening, 483
Taylor, D. W., temperature control for electroplating vats, 99
Taylor, F., flying shears, 71
Taylor, H. F. *See* Grott, G. J.; Navarro, J.; Reynolds, C. C.; Sullivan, E. J., jun.
Taylor, H. G., modern welding, 477
Taylor, J., *Paper*: "The Carbon Deposition Reaction over Iron Catalysts," 1
Taylor, R. J., biographical note, 349; *see also* Ineson, E.
Taylor, V. J., and **L. R. Huizenga,** upset forgings at American Brake Shoe Co., 94
Tebble, R. S., Barkhausen effect, 241
Teed, P. L., fatigue, 484
Teindl, J., and **L. Bezecný,** metallography of lead coatings, 235
Teindl, J., and **E. Hila,** corrosion of pit ropes, 379
Templeton, H. C., steel melting in basic arc furnace, 87
Ternes, H. *See* Steinrath, H.
Terpilovskii, N. N. *See* Koshergin, S. M.
Tesch, T. A., distribution of stock in blast furnace, 355
Tesio, M., errors in heat measurements, 82; natural gas burners for industrial furnaces, 215
Teskey, J. W., and **W. L. Murphy,** increasing open-hearth production, 355
Teter, M. A., carbide flame-plating in powder metallurgy, 100
Texter, A. J., gas purging electric arc furnace, 356
't Hart, H., sand blasting, 234
Thibaut, C. G., coke and iron division of IRSID, 352
Thibaut, C. G., B. Menuet-Guilbaud, M. Pasquet, and **P. Vigneron,** bulk density of coke, 467
Thibaut, Ch. G., P. Vigneron, and **B. Menuet-Guilbaud,** properties of six cokes, 215
Thibaut, J., metallurgical coke-tests, 82
Thielsch, H., electrodes and welding rods, 364
Thielsch, H., and **C. S. Pulliam,** inert-gas tungsten-arc welding of piping, 97
Thierry, P., blast furnaces in United States and France, 468; *see also* Legendre, M.
Thomas, A., and **R. Wildenstein,** analysis and testing of coking coals and cokes, 352
Thomas, C. C., reversing hot strip mills, 363
Thomas, J. D., and **S. R. Rouse,** interference microscope for thickness measurement of chromium plating, 107
Thomas, J. M. *See* Spooner, N. F.
Thomas, J. M., and **J. F. Carlson,** errors in elevated-temperature tension tests, 100
Thomas, R. D., and **L. K. Poole,** mechanical properties of modified type 347 weld metals, 97
Thomas, V., siliceous and titanium-bearing inclusions, 63
Thomas, W. R. *See* Leak, D. A.
Thomas, W. R., and **G. M. Leak,** *Paper*: "Strain Ageing of Alpha Iron". *Discussion*, 64. *Author's Reply*, 68; binding energy of nitrogen in dislocation, 243; condition of boron in α-iron, 243
Thompson, F. W. *See* Metzger, A. J.
Thompson, N., dislocation in face-centred cubic lattices, 374
Thompson, N. M., placement of castable refractory, 83
Thompson, P. F. F. *See* Arblaster, H. E.
Thompson, S. A. *See* Matlock, H.
Thon, E. *See* Martin, W.
Thring, M. W., flame radiation research, 467; improving furnace performance by model investigation, 225; increasing emissivity of coke-oven-gas flames, 214; reheating and heat-treatment furnace practice, 360; *see also* Horn, G.; Pearson, S. W.
Thum, E. E., accidents with large forgings, 228
Thurman, A. L., and **D. Hancke,** continuous mill drives, 476
Tidwell, E. D. *See* Plyler, E. K.
Tietz, H., materials for high temperature steam, 104
Tigeot, J., cast metals in naval construction, 371
Tikhonov, A. A. *See* Krasnichenko, L. V.
Till, J. W., a furnace scanning periscope, 47; oil in open-hearth steelmaking, 49, 51
Timmons, G. A. *See* Archer, R. S.; Scholze, W. G.
Timoshenko, S., stress concentration, 482
Tipper, C. F. *See* Baker, J. F.
Tisinai, G. F., J. K. Stanley, and **C. H. Samans,** austenitic Fe–Cr–C–N stainless steels, 106
Titov, V. A. *See* Kazarin, V. I.
Todd, F. C., J. E. Drennan, and **W. W. Kleinschmidt,** solid state purification of Mo, 359–360
Tolmon, F. R., and **J. F. Hall,** Rockwell hardness testing, 487
Tomashevskaya, G. V. *See* Gorenshtein, M. M.
Tomashov, N. D. *See* Kazarin, V.I.
Tomashov, N. D., and **Yu. N. Mikhailov,** protection potential of metal in ground, 494
Tonomura, H., lubricating engineering 232
Tooper, E. B., treatment of plating solutions by ion exchange, 479
Török, M., and **G. Szikora,** spectro-analytical determination of C in steels, 245
Toropov, N. A., and **A. I. Boikova,** solid solutions of calcium aluminoferrates, 469
Tottle, C. R. *See* Rotherham, L.
Tottori, T., properties of molten iron, 223; *see also* Okamoto, M.
Towe, G. C., H. J. Gomberg, and **J. W. Freeman,** wet-process autoradiography, 495
Towler, F. H., modern forging presses, 199
Trägårdh, K. F., corrosion protection of buried steel, 379
Trant, J. N., and **R. G. Megaw,** bubble control in poured investment plasters, 91
Trautmann, B., cathodic protection of conduits, 108
Trebukhin, V. D. *See* Tyurin, A. I.
Tredre, B. E. *See* Bedford, T.
Trehearne, B., fusion-welding processes for vitreous enamelling, 480
Tremlett, H. F., and **W. A. Johnson,** aluminium-sprayed steel, 109
Trenkler, H., and **H. F. Hauttmann,** LD-process of steelmaking with oxygen jet, 218
Trentini, B., oil in open-hearth steelmaking, 51; temperature curves at end of dephosphorization, 219; *see also* Leroy, P.
Trentini, B., and **P. Leroy,** continuous measurement of bath temperature, 86
Trentini, B., P. Leroy, and **M. Gombert,** continuous temperature measurement in Bessemer converter, 217
Trentovius, M. E. *See* Gerasimova, N. G.
Treweek, J. E. *See* Ramsaur, O.
Trewern, L. C. *See* Gordon, F. R.
Triché, H., and **J. Simon,** optical spectra, 109
Trigg, W. M., Westinghouse metallurgical plant at Blairsville, 112
Tripp, H. P., and **B. W. King,** thermodynamic data on oxides, 83

Trofimov, V. I., plastic deformation in low carbon steels, 238
Troiano, A. R. *See* Dana, A. W., jun.; Frohmberg, R. P.
Trombe, F., and **M. Foex**, melting metals by solar energy, 217; thermal treatment of refractory materials in solar furnace, 468
Trömel, G., W. Jäger, and **E. Schürmann**, iron/iron–oxide/lime system, 220
Trömel, G., and **W. Oelsen**, dephosphorization of iron by lime, 220
Trommer, W., behaviour of steels during solidification, 225; manufacture of steel castings, 90
Trout, H. E., Chevrolet Tonawanda Plant, 473
Troy, E. C., application of insufficient chills, 92
Truszkowski, W., deformation of plastic metals, 482
Tsaritsyn, A. N. *See* Arsenishvilil, A. Yu.
Tselikov, A. I., distribution of pressure on roll faces, 95
Tselikov, A. I., A. A. Korolev and **N. P. Zhetvin**, combined multi-roll mill for rolling thin strip, 230
Tsukanov, G. È. *See* Chekmarev, A. P.; Molotkov, L. F.
Tsuya, K., bainite transformation, 373; *see also* Mitsuhashi, T.
Tsvibel, V. N., B. A. Krupitskii, and **L. N. Balakina**, electrospark hard-facing, 361
Tsylev, L. M. *See* Bardin, I. P.; Zhilo, N. L.
Tsylov, L. M. *See* Bardin, I. P.
Tubal Cain, artificer in metals, 246
Tuchschmid, H., microhardness measurements on deformed metals, 106
Tuddenham, W. M., and **G. R. Hill**, catalytic effects of elements on steam carbon reaction, 353
Tulumello, A. C. *See* Stareck, J. E.
Turin, J. J., and **J. Huebler**, combustion in industrial furnaces, 360
Turkdogan, E. T. *See* Corney, N. S.
Turkdogan, E. T., S. Ignatowicz, and **J. Pearson**, *Paper:* "Effect of Alloying Elements on the Solubility of Nitrogen in Iron: Part II." *Discussion*, 52. *Correspondence*, 55. *Authors' Reply*, 56
Turkdogan, E. T., L. E. Leake, and **R. A. Hancock**, *Paper:* "The Thermodynamics of Carbon Dissolved in Iron Alloys." *Discussion*, 52. *Correspondence*, 55. *Authors' Reply*, 56
Turkerich, A. *See* Reed, G. W.
Turnbull, D., diffusion short circuits, 374; phase transformations, 373; *see also* Cech, R. E.
Turner, N. H., ingot cooling, 444; metallic recuperators at Appleby-Frodingham Steelworks, 82
Tyagus, V. A. *See* Leporskiĭ, V. V.
Tye, R. P., biographical note, 78; *see also* R. W. Powell
Tyurin, A. I., F. G. Rostovshchikov, V. D. Trebukhin, S. A. Chervonnyi, N. A. Vecher, and **I. K. Skorichenko**, "hot cooling" of O.H. furnaces, 218
Tyvaert, P., surface preparations of cast iron, 366; *see also* Rabot, R.

Ubbink, J. J., coarse steel powder, 234
Uchikawa, S., rolling flat steel in Japan, 229
Udin, H. *See* Huggins, R. A.
Udupa, H. V. K. *See* Ray, S. K.
Ueno, M., T. Mitsuhashi, and **Y. Nakano**, ball-bearing steels, 102, 470
Ueno, M., and **T. Mura**, tempering temperature of ball-bearing steels, 240
Uhlig, H. H., corrosion research at Massachusetts Institute of Technology, 494
Uhlir, A., micromachining with virtual electrodes, 478
Ulanovskii, I. B., film-resistance in cathodic protection, 494
Ullmann, W., Agietron electro-erosion unit, 478; electro-erosive machining of metals, 233
Ulrech, R. G., vacuum technology, 359
Umnov, V. D. *See* Garger, K. S.
Urazgul'deev, A. Kh. *See* Karnaukhov, M. M.
Urazov, G. G. *See* Bogatskii, D. P.
Uzhik, G. V., strength and plasticity of metals, 369

Vagramyan, A. T. *See* Solov'eva, A.
Vallet, P., solidification of ingots, 470
Van Atta, C. M., and **R. L. Sylvester**, Kinney mechanical booster vacuum pump, 359
Van Bueren, H. G., formation of lattice defects during plastic strain, 367; *see also* Smit, J.
Vandeghen, A., gas engine at Cockerill, 214
van den Boomgaard, J., zone melting processes for pure compounds AB, 473
Van den Bosch, M. *See* Cournot, J.
Van der Ben, C. R., cast irons for diesel engines, 472
Vanderploeg, E. J., cold roll forming, 231; roll-formed sheet-metal parts, 363
van der Wagt, A. J. *See* Schultinck, L.
van der Willigen, P. C., and **L. F. Defize**, carbon dioxide welding of steel, 477
Vandestrick, F., oxygen-enrichment and oxygen-steam blowing in basic converter process, 86; *see also* Desoer, A.
Vandeventer, R. E., and **F. McFarland**, residual stresses in cast cylinder blocks, 225
Van Muylder, J. *See* Laureys, J.
van Rossum, O., behaviour of steels exposed to hydrogen, 371
Van Uitert, L. G., high-resistivity nickel ferrites, 481
van Waes, J. P. M., and **H. E. Quanjel**, 'Emma' coking plant of Netherlands States Mines, 214
Van Wolraven, A. J., Ymuiden sheet and tinplate works, 96
Varco, W. Lo., permissible stresses in crane structures, 231
Varsányi, F. *See* Bardócz, Á.
Vartanian, P. H. *See* Ayres, W. P.
Vashchilo, P. A. *See* Chekmarev, A. P.
Vasilchikov, M. V. *See* Kuzmin, A. D.
Vasil'ev, D. I., and **V. A. Arbuzov**, operating experience, Kamysh-Burunsk sinter plant, 213
Vasin, Yu. P. *See* Khazanova, T. P.
Vaupel, O. *See* Pfender, M.
v. Bogdandy, L., cropping of ingots for wheel rims, 357
Večeřa, Z., and **B. Bieber**, separation and direct determination of Ti, Fe, and Al, 245
Vecher, N. A. *See* Tyurin, A. I.
Vendl, A., and **T. Mándy**, distinguishing pyrites from marcasite, 380
Verhulst, M., operational research, 496
Verhuven, H., administrative training courses for foremen, 496
Verkhovskii, B. I. *See* Bogachev, A. M.
Verma, G. S., determination of elastic constants of solids, 370
Vernikovskii, V. V., and **I. I. Yamzin**, temperature regulating in electric-resistance furnaces, 356
Vernon, C. W. J., ultrasonic examination, 370
Vernotte, P., division of heat between rubbing bodies, 370
Verrijp, M. B. *See* Fast, J. D.
Verson, M. D., press selection, 94
Vezzosi, I. M. *See* Riccoboni, L.
Vibrac, J., modern blast furnace, 84
Vigneron, P. *See* Thibaut, C. G.
Vigness, I. *See* Smith, R. C.
Villain, P., high-temperature steels in high-temperature recuperators, 82
Vinokurov, I. Ya. *See* Ryabokon, N. K.
Vishnayakov, A. V., and **A. M. Samarin**, influence of blowing with CO on steel produced in electric furnaces, 220
Vishnevetskii, Z. D., polarization-optical method of measuring stresses, 239
Visvanathan, S. *See* Narayan, S. N. Anant; Wadia, N. J.
Vivarelli, S., determination of elements in stainless steels, 110
Vladimirov, L. P., statistical methods in quality control, 367
Vladimirskii, T. A., and **N. V. Pashkov**, tensile tests on boilers and vessels, 484
Vogel, R. *See* Schneider, R.; Stengel, B.
Vogel, R., and **W. von Mässenhausen**, system silver–iron–silicon, 492
Vogel, R., and **G. Zwingmann**, Fe–Be–P system, 107; Fe–P–Sn system, 107
Voinov, S. G., electric melting of steel, 470
Volianik, N. *See* Blanc, G.
Volkov, Yu. N., wire-drawing machines, 475
Volkova, Z. A. *See* Bruk, A. S.
Volobuev, V. I., wire rolling mill practice, 476
Volokhvyanskaya, È. S., and **N. P. Shchapov**, developments abroad in methods of evaluating tendency of structural steels to brittle fracture, 488
Von Asten, W., low-frequency induction furnace, 92
von Fredersdorff, C. G., reactions of C with CO_2 and with steam, 215
von Hofe, H., metal spraying, 236
von Mässenhausen, W. *See* Vogel, R.
Vonnemann, R., steam-cooling by convection flow, 96
Vorobeikov, A. M. *See* Pen'kov, A. M.
Vorwerk, O., P. Hüttemann, and **R. Mintrop**, aluminous blast-furnace slag, 85
Voskoboinikov, V. G., sulphur in blast-furnace smelting, 85
Voskuil, J., model tests in brick industry, 215
Vrutsevich, Z. A. *See* Rozenfel'd, I. L.
Vyverberg, R. G., H. E. Clark, and **K. H. Dessauer**, industrial xeroradiography 488

Waber, J. T., and **B. Fagan**, mathematical studies on galvanic corrosion, 244
Waché, X., discontinuous elongation of austenites, 238
Wada, K., pig-iron making process in Japan, 216
Wadia, N. J., V. G. Paranjpe, and **S. Visvanathan**, desulphurization of steel by soda-ash treatment, 220; slag-metal equilibria in ferromanganese production, 88
Waeser, B., cathodic protection of metals, 380
Wagener, P. *See* Biren, J.
Wagner, C. *See* Hendus, H.
Wagner, E. O. *See* Parry, V. F.
Wagstaff, J. B., and **E. A. Nirmaier**, air flow in beds of granular solids, 355
Waite, W. G., cathodic protection, 378
Walde, H., electric iron-making, 469
Walecsek, A. *See* Myslivec, T.
Walker, C. D. H., H. R. Curnick, and **N. E. Dobbins**, *Paper:* "The Production of Open-Hearth Steel, with Particular Reference to Roof Life, 410
Walker, P. L., flames of CO, hydrocarbon and air, 81
Wallace, J. F., *Paper:* "The Scale Effect in the Cup Drawing Test", 144; biographical note, 209; pressure-tight steel castings, 224
Wallace, J. F., and **G. J. Snider**, shell moulding at Watertown Arsenal, 359
Wallace, J. R., E. P. Duchemin, and **W. Snow**, metallurgical coke in Canada, 353
Wallbank, A. W., electrodeposition, 99
Wallner, J., double etching, 490

Wallquist, G., forces and work in hot sawing, 95; hot-rolling, 229
Walmsley, R. G., rolling-mill bearings, 95
Walter, L., automatic furnace-temperature control, 354; electronic inspection of continuous strip, 476; maintenance of pyrometers, 83, 354
Walterspiler, L., enamelling of sheet iron and steel, 366
Walton, C. F., quality control in grey iron foundry, 357
Walton, J. D., clay samples for differential thermal analysis, 83
Waple, F. R., blanket conveyor, 476
Warburton-Brown, D., induction heating, 93
Ward, C. E., and **M. F. Littmann**, magnetic-amplifier performance, 487
Ward, R. G., ingot structure, 450; solubility of carbon and nitrogen, 53
Wasberg, K. C., manufacture of metal powder, 237
Washburn, J. *See* Parker, E. R.
Watanabe, M. *See* Okada, M.
Watanabe, T. *See* Gotô, H.
Waterhouse, R. B., fretting corrosion, 492, 494; *see also* Schulman, J. H.
Waters, B. H. C., shell moulding, 359
Wattleworth, D. R., Bessemer process, 438; *see also* Cawley, F. B.
Watts, A. B., and **H. Ford**, yield-stress curve, 484
Webb, D. J., direct-reading analysis with medium quartz spectrograph, 244
Weber, W., temperature measurement and control, 83
Webley, L., silica dust, 88
Webster, R. R., X-ray tin thickness gauge, 488
Weeber, H. *See* Möller, H.
Weertman, J., steady-state creep, 101
Wegner, U., and **H. Lindemann**, applying carbides to bar skimming, 364
Weibull, H., measurement of elastic constants, 482
Weidermann, H. *See* Linder, F.
Weil, F. C., adhesion of vacuum-evaporated metal films, 99
Weil, R., and **H. J. Read**, structure of electrodeposited metals, 98
Weinberg, F. J., mechanism of combustion, 214
Weinberg, M., and **A. Lake**, bumper guards, 479
Weineck, H., oil firing in integrated steelworks, 353
Weiner, J. H. *See* Freudenthal, A. M.
Weisbaum, S., and **H. Boyet**, broad-band non-reciprocal phase shifts, 481
Weisberg, L., and **E. J. Quinland**, recovery of plating wastes, 365
Wellauer, E. J., steel castings in welded structures, 111
Wellenius, L. *See* Fagerberg, B.
Wellensiek, G., dust in construction of recuperators, 214
Wellinger, K., and **P. Gimmel**, behaviour of welds in pulsating tensile tests, 238
Wells, A. A., test rig for brittle fracture research, 369
Wells, A. O., corrosion in petroleum refinery plant, 378
Wells, J. E., *Paper:* "The Aluminium Reduction Method for the Determination of Oxygen in Steel", 185
Wepner, W. *See* Houdremont, E.
Wernick, S., metal finishing in Britain, 99
Wernicke, H. J., flame cutting in steel works and rolling mill, 233
Wesemann, F., coke properties, 82; efficiency in management, 111
Weser, W. *See* Dehlinger, U.
West, T. S. *See* Belcher, R.
Westbrook, J. H., hardness of equi-atomic iron group aluminides, 107
Westbrook, L. R. *See* Roehl, E. J.
Westlund, C., compressed air system at Kiruna, 80
Wever, F. *See* Krisement, O.
Wever, F., M. Hempel, and **A. Schrader**, metallographic investigation of strain phenomena, 482
Wever, F., and **A. Schrader**, electron microscope investigations on Cr–Ni–Mo steel, 105
Wheeler, W. H., cavitation erosion, 494
Wheeldon, K. A. *See* Bell, R. P.
White, F. R. L., foundry ventilation and heating, 471
White, H. J., modern electrical precipitation, 354
White, J., chemistry of open-hearth roof refractories, 216
White, W. H., dust problems in dressing and fettling shops, 471
White, W. J., shell moulding, 357
White, W. T., corrosion in Australian paper industry, 378
Whitehouse, A. M., biographical note, 463; *see also* Ridgion, J. M.
Whittingham, G., high-temperature reactions for coal minerals during combustion, 213
Whittington, W. T. *See* Reynolds, C. C.
Wi, K., working of sand slinger, 91
Wickert, K., and **H. Wiehr**, reactions between CuO and Fe or Fe_3O_4 in solid state, 107
Wiedersich, H. *See* Cochardt, A. W.
Wiegand, H., M. Koch, and **H.-J. Meyer**, hardness testing with small loads, 485
Wiegand, H., K. Schaar, and **F. Nieth**, de-scaling of rolled material, 234
Wiehr, H. *See* Wickert, K.
Wiester, H. J., ageing of steels, 238; *see also* Houdremont, E.; Krisch, A.
Wigglesworth, J. H. *See* Kain, C. H.
Wiggs, P. K. C., "mock-up" laboratory furnaces, 87
Wilcock, R., use of electric arc furnace in steelmaking, 356
Wildenstein, R. *See* Thomas, A.
Wilhelm, E. J., and **R. F. Kayser**, current distribution in acid copper plating solution, 480
Wilkinson, H. C., determination of sulphur in coal, 245; *see also* Mott, R. A.
Wilkinson, Isaac, ironmaster and inventor, 382
Williams, A. K., enamelling on cast iron, 98
Williams, B. E. *See* Calnan, E. A.
Williams, C. B., clean steel castings, 224
Williams, E., Hadfield's and Taylor and White's metallurgical discoveries, 496
Williams, G. H., and **H. O'Neill**, *Paper:* "The Straining of Metals by Indentation including Work-Softening Effects." *Correspondence*, 22. *Authors' Reply*, 23
Williams, H., flying shears, 71
Williams, L. S., stress-endurance of sintered alumina, 354
Williams, T. H., modernization of plate mill, 363
Williamson, G. K., and **R. E. Smallman**, dislocation densities, 243
Williamson, S. H. *See* Kaufmann, G. A.
Willis, G. M., kinetics of corrosion reactions, 377
Willott, R. L., biographical note, *Frontispiece*
Willows, P. W., biographical note, 78
Wills, N. R., Australian iron and steel industry, 382
Wilsdorf, H., and **D. Kuhlmann-Wilsdorf**, dislocations in Al–Cu alloys, 374
Wilson, J. E. *See* Shnay, R. C.
Wilson, J. L., J. E. Claussen, and **C. E. Jackson**, electrode melting rate, 478
Wilson, S. H., metal finishing in New Zealand, 99
Wimmer, T., continuous strip mill, 363
Winchester, A. J., reel control systems, 363
Windeler, E. L. *See* Leach, C. B.
Wingate, D., obituary, 462
Winger, A. G. *See* Horner, C.
Winkler, O., degassing of metals, 359
Winning, J., and **S. Miller**, determination of Ni, Cr, and Mo, using Spekker absorptiometer, 245
Winter, O. W., shell-moulded castings, 222
Winton, D. A., electro-zinc coated steel sheet and strip, 236
Wisner, L. H., water-cooled cupola for consistent control of castings, 223
Wittek, Z. *See* Czyzewski, M.
Wittmoser, A., and **H. Bockshammer**, residual analysis of pig iron and cast iron, 245
Wittmoser, A., and **W.-D. Gras**, residual analysis of pig iron and cast iron, 245
Wittrock, H. J., aluminium coating uniformity, 236
Wogin, R. *See* Jackson, W.
Wolf, W., mechanized strength testing of blast-furnace coke, 467; steel bridges for German motor roads, 381
Wolfendale, A. W. *See* Lloyd, J. L.
Wolff, R. H., salt spray corrosion of cadmium, 98
Woo, D., H. P. Simons, and **P. R. Jones**, infra-red drying of clay, 83
Wood, W. A., creep processes, 485
Wood, W. P. *See* Zimmerli, F. P.
Woodfine, B. C., alloy steels, 456
Woods, A., shell moulding, 91
Woolman, J., reproducibility of hardness tests, 487
Wordsworth, C., locomotives for heavy industry, 232
Work, C. E., and **T. J. Dolan**, experimental stress analysis in torsion research, 482
Wormwell, F., and **G. Butler**, corrosion of ferrous metals in heat-exchange systems, 493
Worner, H. K., cost of corrosion, 377
Wrangell, L. J., E. C. Bernam, D. F. Kuemmel, and **O. Perkins**, colorimetric determination of Mo in tungsten-bearing steels, 381
Wright, M. W., hidden arc welding of railway wagons, 478
Wuellner, J. F., and **B. J. Sweo**, strains in enamelled cast iron, 236
Wulff, J. *See* Huggins, R. A.
Wurth, J., low-shaft furnace, 84; *see also* Descer, A.
Wyman, C. H., influence of core-making materials on hot tears, 358
Wynne, W. L. L., 5-stand cold mill drive for Richard Thomas and Baldwins Ltd., 476
Wyss, V., hardness testing after fronta quenching, 369

Yaji, S. *See* Ishida, H.
Yakutovich, M. V. *See* Moiseev, A. I.
Yalmann, R. G., iodometric determination of Co, 109
Yama, S., and **K. Nagami**, making of small rimming steel ingot, 221
Yamamoto, Y. *See* Friedmann, N. E.
Yamaoka, T., control systems in Japan, 367
Yamauti, Z., measurement techniques in iron and steel industry, 367
Yamzin, I. I. *See* Vernikovskiĭ, V. V.
Yarovoi, M. I. *See* Dolmatov, E. M.
Yaskevich, A. A. *See* Samarin, A. M.
Yasui, K. *See* Arakawa, M.
Yavnel', A. A., type MI machine for friction tests, 371
Yazawa, S., plug drawing of steel tubes, 362
Yee, T. B., J. S. Machin, and **A. S. Andrews**, viscosity of enamel glasses, 236
Yeo, R. B. G., metallurgical aspects of welding, 97
Yoda, R., spheroidization of graphite in iron, 223; *see also* Okamoto, M.
Yokoyama, T., research on iron-cobalt alloys, 367
Yoshimura, H., iron and steel standard specifications in Japan, 367
Youmans, E. D., power and control cables for steel mills, 231

Young, M. K., gypsum cement moulds for plastic patterns, 224
Young, R. T., and **L. H. Davenport**, New Zealand foundry practice, 357
Youngdahl, P. F. *See* Flinn, R. A.
Yudson, A. A. *See* Borodin, V. P.
Yuferov, V. M. *See* Molotkov, L. F.
Yukawa, M., rolling of bars and sections in Japan, 95
Yurist, I. M., and **P. G. Shakhova**, determination of boric acid in nickel-plating electrolytes, 244
Yuza, V. A. *See* Roiter, V. A.

Zaat, J. H., hardness and plasticity of metals, 100
Zackay, V. F. *See* Morgan, E. R.
Zadumkin, S. N., surface tension of metals, 367
Zagar, D. *See* Markovic, T.
Zagar, L. gas-permeability determination, 354; size distribution of pores in refractory materials, 354
Zagyanskii, A. L., behaviour of zinc in blast furnaces, 216
Zaikova, V. A., and **Ya. S. Shur**, coercivity of soft magnetic materials and sheet thickness, 487
Zaĭtsev, G. Z., service tests on universal hydraulic machines, 237
Zaleski, F. I. *See* Steinitz, R.
Zalkin, V. M. *See* Gulyaev, A. P.
Zamorani, G., corrosion of condenser tubes, 244
Zamyatnin, M. M., Yu. V. El'tsin, and **B. I. Zvyagin**, depth of cementation of alloy steel by isothermal hardening, 228
Zamyatnin, M. M., L. B. Getsov, and **E. L. Grinzaĭd**, distribution of C in cementation and decarburization of steel, 490
Zaplatynskyj, I. *See* G.-C. Kuczynski
Zaslavskii, Yu. S., and **G. I. Shor**, wear of machine parts, 370
Zaslavskii, Yu. S., G. I. Shor, and **F. B. Lebedeva**, wear of machine parts, 241
Závěský, V., testing of metallurgical refractories, 468
Zayats, A. A. *See* Petrichenko, A. M.
Zedník, V., and **M. Šicha**, effect of gases in pig irons and cast irons, 89
Zeicher, M., powder metallurgy, 99
Zel'bet, M. P. *See* Gulyaev, A. P.
Zelentsov, P. N., microscopical investigation of transparent objects, 489
Zemsch, P. *See* Lihl, F.
Zezulová, M. *See* Pobořil, F.
Zheltov, D. D. *See* Dashevskiĭ, Ya. V.
Zhetvin, N. P. *See* Tselikov, A. I.
Zhilo, N. L., and **L. M. Tsylev**, viscosity of slags during smelting ferroalloys in blast furnace, 221
Zhironkin, A. N., A. D. Men'shikov, and **P. D. Khinskiĭ**, mechanical properties of large forgings, 474
Zhuravleva, M. G. *See* Chufarov, G. I.
Zietlin, E. A., allowable stresses for thin metal structural elements, 484
Zimmerli, F. P., and **W. P. Wood**, chrome-steel springs, 246
Zindel, E. *See* Kopp, H.
Zirilli, R., self-regulating chrome bath, 365
Zörner, A., E. Krath, and **H. Feucht**, determination of minor constituents in steels, 110
Zoss, L. M., S. N. Suciu, and **W. L. Sibbitt**, solubility of oxygen in water, 383
Zot'ev, A. I., tests of aluminium-killed steel for cold upsetting, 474
Zrimsek, A. H., E. H. Belter, and **R. W. Heine**, malleable iron, 471
Zrimsek, A. H., and **R. W. Heine**, green strength in moulding sands, 224
Žumer, M., and **F. Širca**, grain-boundary displacement during secondary recrystallization, 490
Zvyagin, B. I. *See* Zamyatnin, M. M.
Zwingmann, G. *See* Vogel, R.

I.
viscosity
rroalloys

kov, and
roperties

, G. I.
for thin
84
chrome-

ne bath,

Feucht,
stituents

. Sibbitt,
er, 383
um-killed

d **R. W.**

ne, green
224
oundary
dary re-

. M.